Dûma 6. The 2015-2016 Report of the Saudi–Italian–French Archaeological Project at Dûmat al-Jandal, Saudi Arabia

Guillaume Charloux, Romolo Loreto

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Dûma 6

The 2015-2016 Report of the Saudi-Italian-French Archaeological Project at Dûmat al-Jandal, Saudi Arabia

Guillaume Charloux & Romolo Loreto

With the participation of Roberto Bottiglieri, Simona Berardino, Charlène Bouchaud, Marianne Cotty, Thamer A. al-Malki, Bruno Marcolongo, Céline Marquaire, Romain Mensan, Marinela Polosa, Dara'an al-Qahtani & Vincenzo Regine

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الحروف الصوتية	Long vowels â, û, î
ة	a

Arabic Alphabet & Transliteration
(contemporary personal names and well-known sites excluded)

الحروف العربية و مقابلها بالاتينية

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- University of Naples "*L'Orientale*", *Dipartimento di Studi Asiatici*.
- CISA, Centro Interdipartimentale di Servizi di Archeologia

The 2015-2016 Season

Affiliations and Partnerships

The project works under the aegis of the following institutions:

- The Saudi Commission for Tourism and Antiquities
- The French National Centre for Scientific Research (UMR 8167, *Orient et Méditerranée*)
- The University of Naples "*L'Orientale*", *Department of Asia, Africa and the Mediterranean*

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- The *Musée du Louvre, Département des Antiquités Orientales*
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- The University of Naples *"L'Orientale", Department of Asia, Africa and the Mediterranean*
- *CISA, Centro Interdipartimentale di Servizi di Archeologia.*
- The National Research Council of Italy, Inst. of Applied Geology [I.R.P.I.], Padova

Participants

The project is directed by Dr. Guillaume Charloux and Prof. Romolo Loreto. The following specialists took part in the project in 2015-2016:

Saudi component

Ahmed A. Al-Qaeed (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)

Dara'an al-Qahtani (archaeologist, SCTA)

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Roberto Bottiglieri (student, archaeologist, University of Naples L'Orientale)

Teodoro Cocozza (student, archaeologist, University of Naples L'Orientale)

Prof. Romolo Loreto (archaeologist, University of Naples L'Orientale)

Prof. Bruno Marcolongo (geomorphologist)

Vincenzo Regine (student, archaeologist, University of Naples L'Orientale)

Marilena Polosa (student, archaeologist – historian, University of Naples L'Orientale)

French component

Dr. Charlène Bouchaud (archaeobotanist, Paris 4 Sorbonne)

Dr. Guillaume Charloux (archaeologist, CNRS)

Anaïs Chevalier (student, university Paris 1 Sorbonne)

Marianne Cotty (archaeologist, Louvre Museum, AO)

Céline Marquaire (student, archaeologist, Paris 1)

Romain Mensan (archaeologist, freelance)

Charly Poliakoff (student, university Paris 1 Sorbonne)

Ronald Schwerdtner (surveyor)

Activities carried out during the season

1. Saudi-Italian component

The 2015 archaeological campaign at Dûmat al-Jandal took place between 15th October – 16th November 2015. The activities carried out by the Italian team at Dûmat al-Jandal focused on the main research topics: extensive excavation in the historical core of the oasis, activated since 2009, and prehistoric survey devoted to the paleoenvironment for the detection of Neolithic and Bronze Age sites in the al-Jawl region.

In detail, both in the historical area and along the wâdî al-Sirhân surroundings several activities took place:

1. The enlargement of Trench 1, at the foot of the Mârid Castle, in order to improve the extensive archaeological area and to define a perimeter around which develop an open air museum. The work involved both archaeological and restoration issues. Of course the enlargement of the trench is a crucial point for a better definition of the oasis' stratigraphy and in preparation of restoration activities (first consolidation's walls interventions took place during this season).

2. The excavation of new trenches inside the Mârid Castle, in order to improve 2014 sounding and investigate the whole surface which is still available for excavation.

3. The beginning of a detailed study of the Islamic pottery from the Sector A area, both from the extensive trench at the foot of the Mârid Castle and from its inner excavated trenches.

4. Geoarchaeological and geomorphological survey of the wâdî al-Sirhân, in particular the Dûmat al-Jandal area and its southern area, within a range of 60 km.

5. Development of a pre-historic GIS project for the study of the al-Jawf landscape evolution during the prehistory and the naissance of the Dûmat al-Jandal oasis.

2. Saudi-French component

The archaeological season of the Saudi-French component took place from March 2nd to April 1st 2016.

Excavations were intensified during this season with the completion of fourteen test pits in the western sector of the oasis (all filled at the end of the field season).

1. Eleven geoarchaeological trenches (soundings 24-25, 27-30, 32-36) were opened with the aid of a backhoe, in order to gain a better understanding of human occupation and palaeoenvironment in the wadi.

2. On the adjacent promontory, excavations focused on Neolithic and Bronze Age features,

on the one hand clearing a monumental platform (sounding 18), an intervention begun in 2015 (See Dûma 5), and on the other hand excavating two small cairns (soundings 26 & 31, A. Chevalier) located on the summit of the promontory. The first 'cairn' turned out to be the base of a stone tower probably dating from the pre-Islamic period, while the second cairn was the remains of a completely looted tomb. Sieving the sediment between the blocks, however, revealed a few bones, a large number of beads and an Egyptian amulet.

3. A semi-buried site located 2 km west of the oasis (sector E) was investigated using a protocol combining geoarchaeological examination with a backhoe and detailed test excavation with workmen. Examination revealed a wealth of agricultural features, including wells, cisterns, channels, etc., possibly dating back to Nabataean times.

4. All this fieldwork gave rise to complementary studies of various kinds: an architectural and topographical study with the creation of digital terrain models, GIS, aerial photography by kite, pottery analysis, C14 and bioapatite datings and the study of plant macroremains.

5. A series of surveys in 2016 focused on the rock art and cairns of a wadi in the Jabal az-Zilliyat located 15 km east of the oasis, revealing notably prehistoric occupations, rock art and Nabataean and Arabic inscriptions. A brief study was also carried out on a new rock art site called the Camel Site near Sakaka, exceptional for the actual size and quality of the dromedary representations sculpted in low and high relief.

All of the photographs taken during the 2010-2016 excavation and survey campaigns were recorded in a relational FMPro database by members of the French component. To date, it contains 8902 photographs, 498 US sheets and 1451 GPS coordinates. The archaeological material collected between 2015 and 2016 is kept in a storeroom not far from the Dûma museum. The material has been stored in airtight, transparent plastic boxes. Unfortunately, some of the artefacts discovered during the first 2010-2012 campaigns have been transferred to Riyadh by the local authorities. We hope to be able to recover them during the next season, so that we can complete their study and examination.

3. Lectures

1. G. Charloux, « Oasis de l'Arabie déserte à travers le temps : résultats de cinq campagnes d'études archéologiques et épigraphiques ». Les conférences d'actualité – midis du Louvre, Musée du Louvre, le 2 octobre 2015.
2. G. Charloux, « Archaeological Discoveries at Dûmat al-Jandal », Dûmat al-Jandal Library, le 24 mars 2016.
3. R. Loreto, « The activities of the Italian archaeological Mission in the Kingdom of Saudi Arabia (2009-2014)». Burj Rafal Kempinski Hotel, Riyadh. 14/01/2015.
4. R. Loreto, «Nomadic and sedentary identities. The development of north Arabian oases during the I millennium BCE.» Rencontres Sabéennes 19, Università di Pisa, 18-20 giugno 2015.

4. Publications

1. Charloux, G., Bouchaud C., Durand C., Monchot H., & Thomas A. 2016. Banqueting in a Northern Arabian Oasis: A Nabataean Triclinium at Dûmat al-Jandal, Saudi Arabia . BASOR 375 (2016): 13-34.

2. Hilbert, Y.H., Crassard R., Charloux G. & Loreto R. 2015. Nubian technology in northern Arabia: Impact on interregional variability of Middle Paleolithic industries ». Quaternary International. https://doi.org/10.1016/j.quaint.2015.11.047.

3. Loreto R. 2015. Preliminary Report of the 2014 Campaign of the Italian Archaeological Mission in the Kingdom of Saudi Arabia in the Framework of the Saudi-Italian-French Archaeological Project at Dūmat al-Jandal (Ancient Adummatu), in B. Genito (ed.), Newsletter di Archeologia CISA, vol. 6, 2015: 211-222.

4. Loreto R. 2015. Tra mare e deserto. Le attività di ricerca dell'Orientale nella Penisola Arabica", in B. Genito (ed.) Newsletter di Archeologia CISA, vol. 6, 2015: 132-145

Geomorphological survey in Dûmat al-Jandal area

Bruno Marcolongo [1]

The fifth geomorphological campaign in Dûmat al-Jandal and surrounding areas, performed in November 2015 as part of the field activities of the Joint Saudi-Italian-French Archeological Project, has been essentially devoted to the survey of Jebel Nejma.

Jebel Nejma is an isolated relief standing over a flat and dry lowland about 55 km to the SW of Dûmat al-Jandal (**Fig. 1**). Being from a geomorphological viewpoint an "inselberg"[2] and therefore a landscape conspicuous point, it has attracted our surveying interest as surely it has been in the past for people in search of sheltered settlement and hunting.

After careful morphological analysis of the altimetry of the whole area, the main hill peaks have been marked. General shape of relief is segmented irregular polygon, which very surprisingly looks like the "Cetus Constellation "(**Fig. 2**), the fourth largest constellation in the sky, once turned down the North (Arab style).

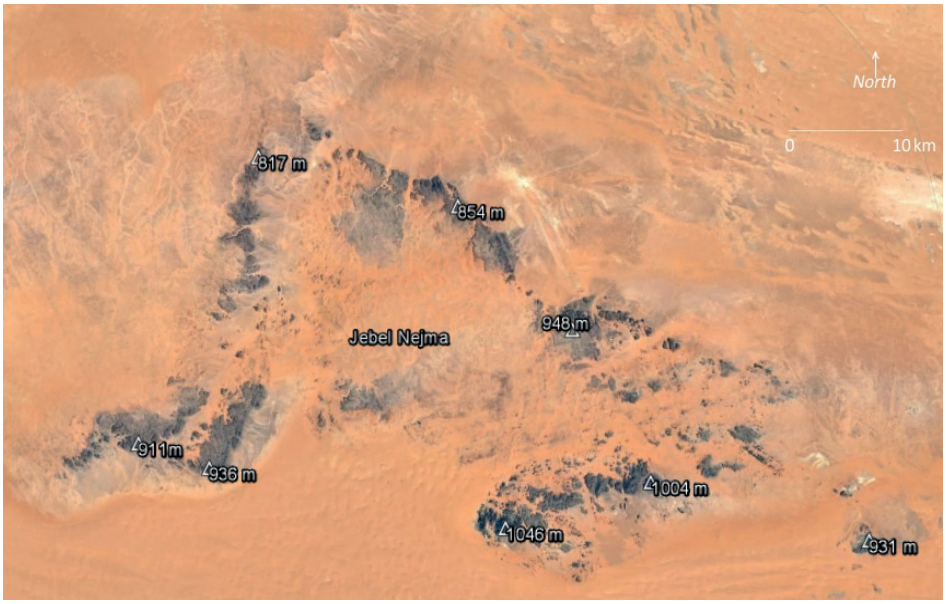


Fig. 1. Jabel Najma in northern al-Nafûd

1. National Research Council of Italy, Inst. of Applied Geology (I.R.P.I.), Padova.
2. An "inselberg" or "monadnock" is an isolated rock hill, knob, ridge, or small mountain that rises abruptly from a gently sloping or virtually level surrounding plain.

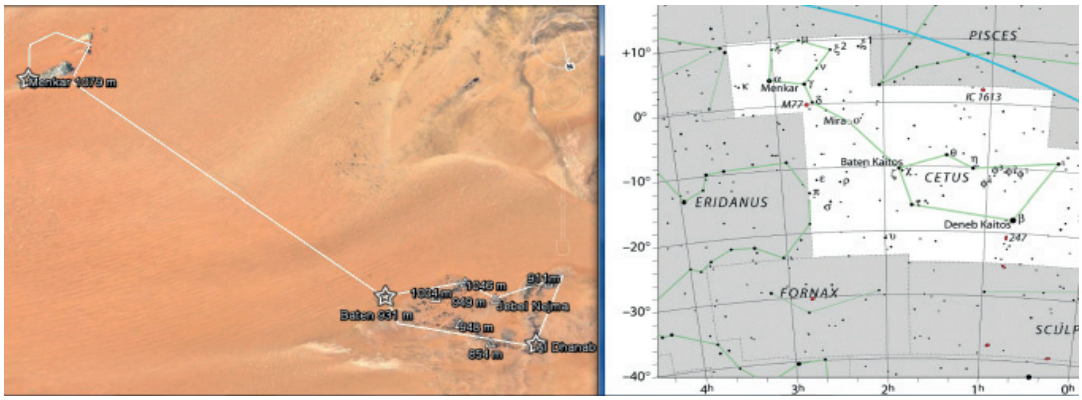


Fig. 2. South-North alignment between Jebel Najma and Jubbah compared to Cetus

In fact, the main relief's summits of Jebel Nejma, distributed all around its edges, are:

- **Peak of SE**
- ***coordinates:*** 29°14'51.76''N, 39°39'58.27''E
- ***elevation*** 1004 m
- **Peak of S**
- ***coordinates:*** 29°12'48.40''N, 39°31'39.19''E
- ***elevation*** 1046 m
- **Peak of SW**
- ***coordinates:*** 29°16'1.60''N, 39°14'50.46''E
- ***elevation*** 936 m
- **Peak of W**
- ***coordinates:*** 29°17'17.37''N, 39°10'48.20''E
- ***elevation*** 911 m
- **Peak of NW**
- ***coordinates:*** 29°31'13.34''N, 39°17'50.39''E
- ***elevation*** 817 m
- **Peak of N**
- ***coordinates:*** 29°28'35.01''N, 39°29'17.68''E
- ***elevation*** 854 m
- **Peak of E**
- ***coordinates:*** 29°22'22.84''N, 39°35'42.92''E
- ***elevation*** 948 m

Their geographical position recall the “Cetus” stars position in the sky. The highest peak in the most North-West corner, well visible from far away, coincides with the brightest star Al-Dhanab, while the star Menkar corresponds to a small “inselberg” nearby Jubbah oasis some 200 km to South-East from central area of J. Nejma (**Fig. 3**). On top of this small “inselberg” is lying a complex of ancient tombs, whose the biggest one, here called “Royal Tomb”, is completed by an entrance “allée” of 30 m length (**Fig. 4**).

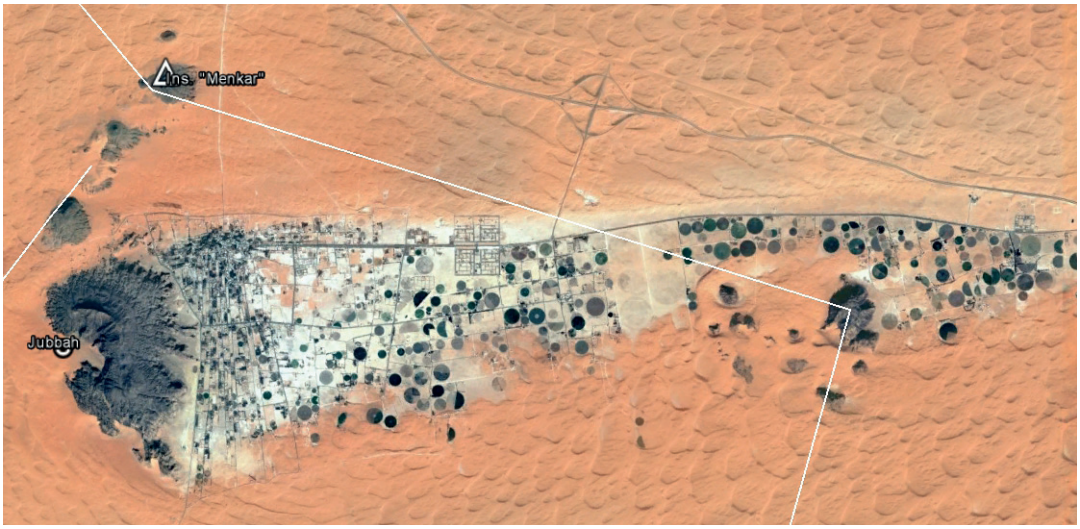


Fig. 3. Jubbah oasis

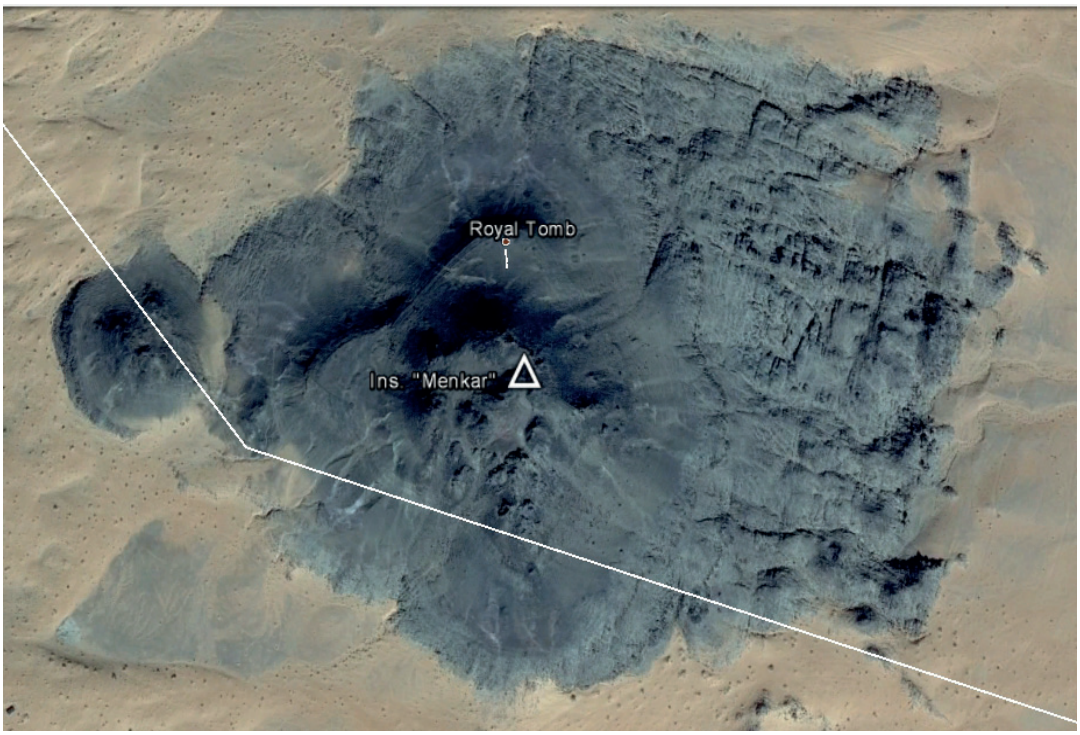


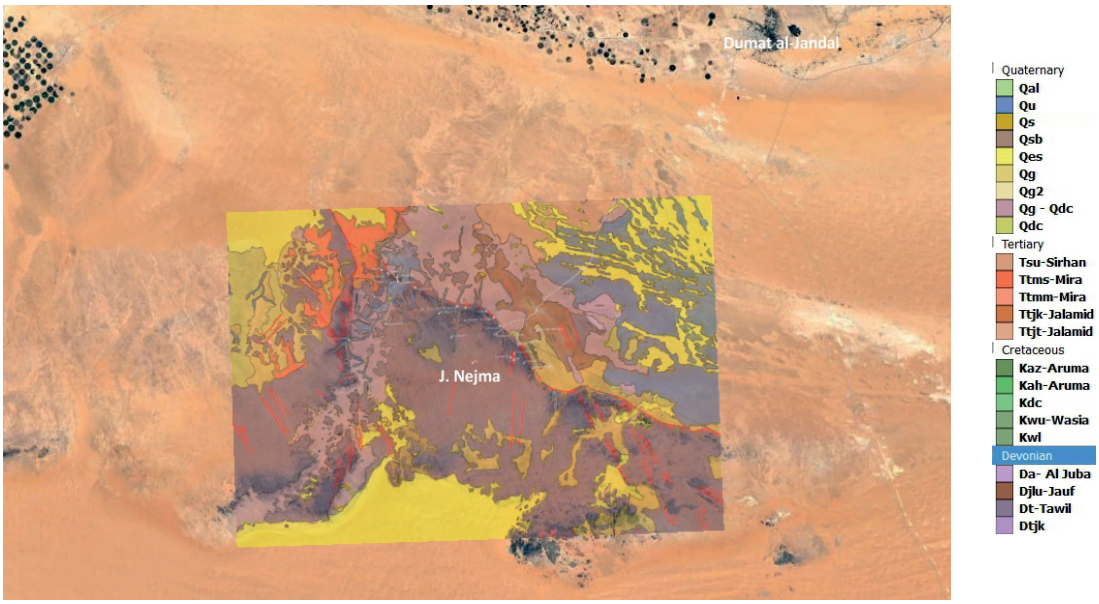
Fig. 4. Jubbah architectonic evidence

Further researches should be done on medieval or more recent Arab texts to see if astronomical observation and data were known about “Cetus Constellation” and if, by chance, ancient geographers were calling the hilly area of “Jebel Nejma” (the hill of the star) knowingly, in force of its analogy with a celestial object.

From the geological viewpoints Jebel Nejma (**Fig. 5**) is formed by sedimentary rocks of lower Devonian period (**DT Tawil Formation**, ferruginous sandstone with quartz pebbles), which are the oldest formation of the entire area (**Fig. 6**).

A so long exposure to weathering agents has generated a deep dissection of the relief, thick crust of desert “vernis” covering all outcrops and large “glacis” band at foothills. Therefore, Jebel Nejma’s aspect is very peculiar and without any doubt it attracts the human being since ever.

Moreover, a suitable environment for human settlement has been developed in these geological and geomorphological conditions. Generally speaking, the wide “glacis” bands bordering almost the whole relief have been selected as places for compounds, while tombs usually lie on elevated spots (**Figs. 7-11**). Typical examples of this settlement model are the following ones: compounds clusters. Left “compound n. 17” (29°32’4.87’’N, 39°21’48.89’’E). Right “compound n. 18” (29°32’24.39’’N, 39°21’41.33’’E).



Figs. 5 and 6. Geological map of Jebel Najma and relative Legenda

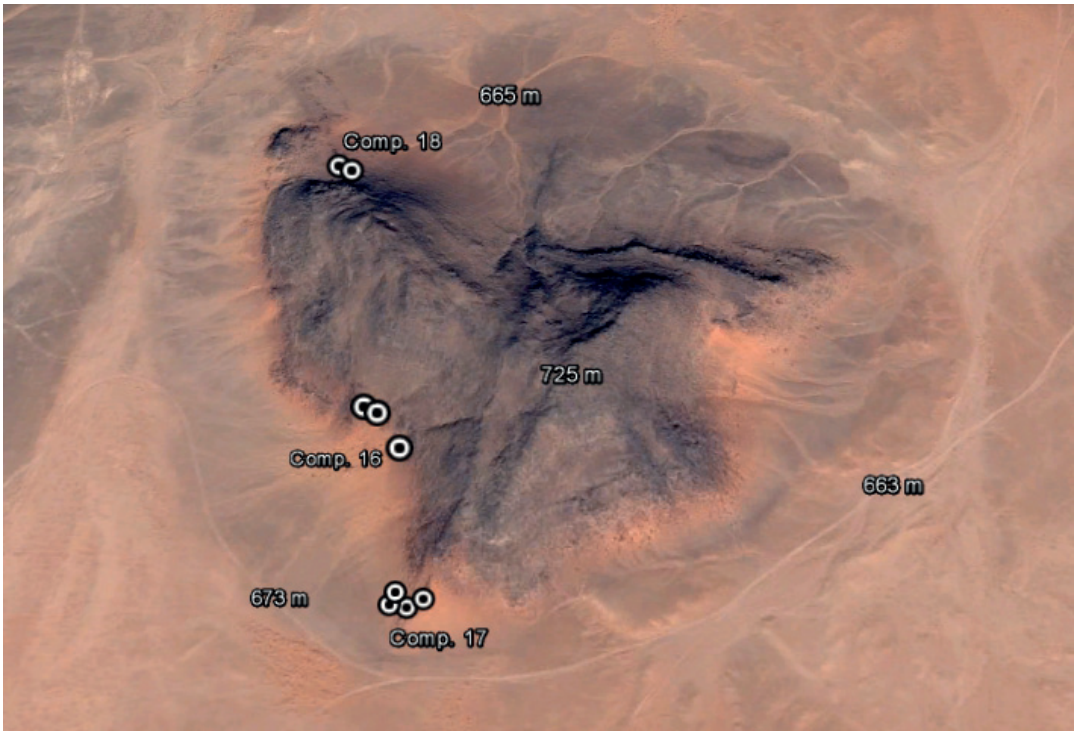
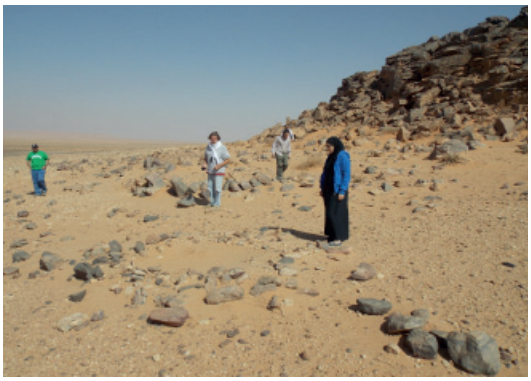


Fig. 7. Compounds on “glacis” of an isolated “inselberg”



Figs. 8 and 9. Ground survey of the above

Fig. 10. Circular tomb on top of an elongated relief, formed by sub-horizontal layers of Dt-Tawil sandstone with quartz pebbles

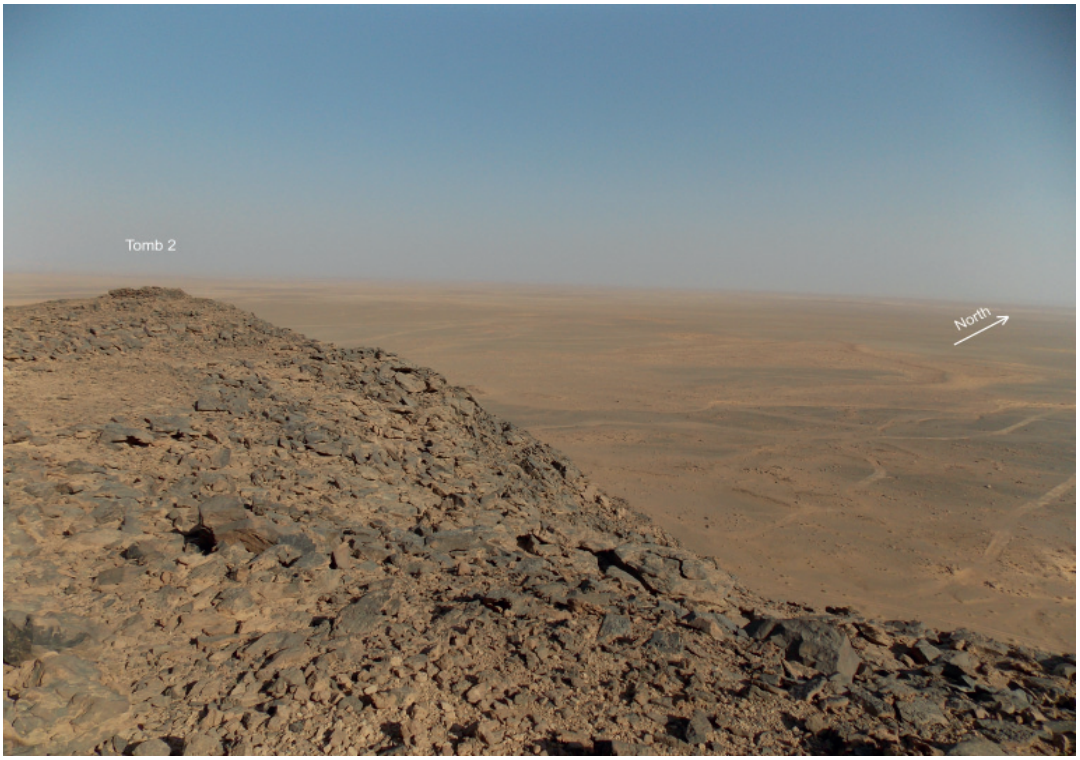


Fig. 11. Ground survey of the circular Tomb n. 2 on top of the ridge of Dt-Tawil sandstone (29°29'39.20''N, 39°28'51.04'' E)

This very tight relation between compounds localization and “glacis” or related landforms, almost exclusive one, allow us to establish a rule in planning a geo-archaeological survey, that is to draw preliminary thematic map highlighting “glacis” bands around reliefs and “inselberg” to find after in the field prehistoric compounds.

The tracks followed during ground survey are shown on the images below (**Figs. 12 and 15**).

Compounds, circular tombs and “kites” are spread in a vast area, constantly lying in their typical geomorphological position, that is for compounds on “glacis”, for tombs on higher relief spots and for “kites” on higher plateau or gently inclined rocky surface (**Figs. 16 and 21**).

The Jebel Nejma is a very promising area and the 2015 geo-morphological survey should be extended also to the northern, western and southern sectors. In fact, a very high concentration of compounds and secondly of tombs and kites is well recognizable on satellite images.

Fig. 12. Survey of eastern slopes of Jebel Nejma

Fig. 13. Survey of northern slopes of Jebel Nejma

Fig. 14 and 15. Survey of central part of Jebel Nejma. Left: general sketch. Right: blowup of the core

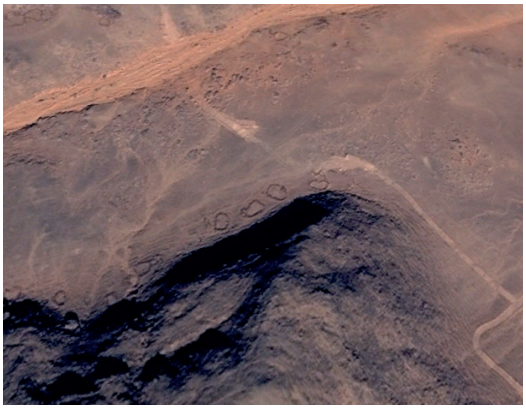


Fig. 16 and 17. Compounds group 10 (29°32'37.54'' N,39°21'5.78''E). Left ground spot. Right Google Earth satellite image Spot Pan 2,5 m

Fig. 17 and 18. Tomb 2 (29°29'39.20''N, 39°28'51.04''E). Left, ground spot. Right, Google Earth satellite image Spot Pan 2,5 m Spot Pan 2,5 m

Fig. 20 and 21. "Kite" (29°25'49.92'' N, 39°24'52.50'' E). Left, ground spot. Right, Google Earth satellite image Spot Pan 2,5 m

The Neolithic of al-Jawf

Preliminary approach for the definition of the paleo-landscape and its anthropic exploitation

Roberto Bottiglieri [1]

Introduction

This contribution aims to highlight the results obtained from both a remote and fields approach to the study of the prehistoric paleo-environment of the Jawf region. This work has been taking shape since 2011 (with the direct participation of the writer since 2013), with the aim of understanding the interaction between several cultural *facies* (Neolithic of the desert - Nafûd - with hunter-gatherers groups; semi-nomads community of the Neolithic of Ḥarrat al-Ḥarraḥ; nomadic groups of the Bronze Age with funerary evidence "turret tombs" types) and the territory, characterized by paleo lakes and paleo streams that allowed the proliferation of vegetation, fauna and, consequently, anthropic communities (**Fig. 1**).[2] The methodology of analysis of these complex prehistoric traditions, which occupied the Jawf region extensively and according to various cultural models, made use of both field prospecting and a GIS (Geographic Information System) instrumentation which involves Remote Sensing, field surveys (also through excavations) and detailed studies on material culture, integrating them with a geoarchaeological approach that defines the paleo-environment of North Arabia.

Methodological approach and research instruments

The applied methodology follows the Landscape archeology approach. It includes those conceptual categories typical of geographic information systems (GIS) such as "movement", "network", "node", "hierarchy" and surface models. The quantitative-statistical method is of decisive importance in the research carried out in arid environments today.

1. University of Naples L'*Orientale*.
2. Loreto 2017: 51-78.

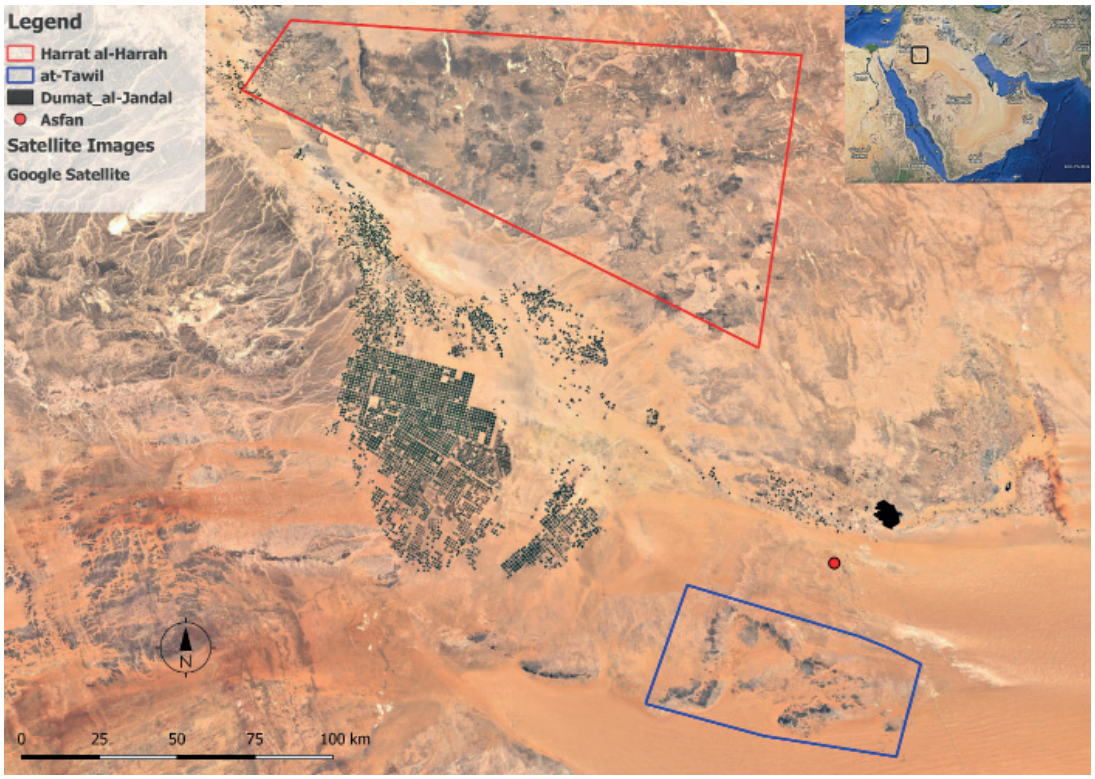


Fig. 1. Sites investigated by the Italian Archaeological Mission (Image created with the software QGIS)

This is the case of North Arabia, characterized largely by the Nafûd desert, but which in ancient times had very different climatic and environmental conditions, with an extensive vegetation cover and a rich wildlife. For example, about fifty kilometers southwest of Dûmat al-Jandal an arenaceous rock formation (Dt-Ṭawîl formation) emerges, which forms the core of an isolated mountain relief called aṭ-Ṭawîl/Jabal Nejma, easily identifiable through the analysis of remotely sensed images on Google Earth (**Fig. 2**). This tool allows to investigate areas that are difficult to access due to both their location in the desert environment and their climate. Aṭ-Ṭawîl/Jabal Nejma revealed the presence of a large number of settlements, particularly concentrated in the *glacis* belts, which were then identified during the reconnaissance on the ground as temporary settlements (220 anthropic structures were recognized in the area of aṭ-Ṭawîl/Jabal Nejma).

The use of geological maps, satellite images, and aerial photographs have resulted in a better knowledge of the North Arabian territory. The ultimate aim is to understand the interaction between Neolithic anthropic communities and the paleo-environment during the Holocene, through an interpretative model of the exploitation of water resources during the wet prehistoric phase.

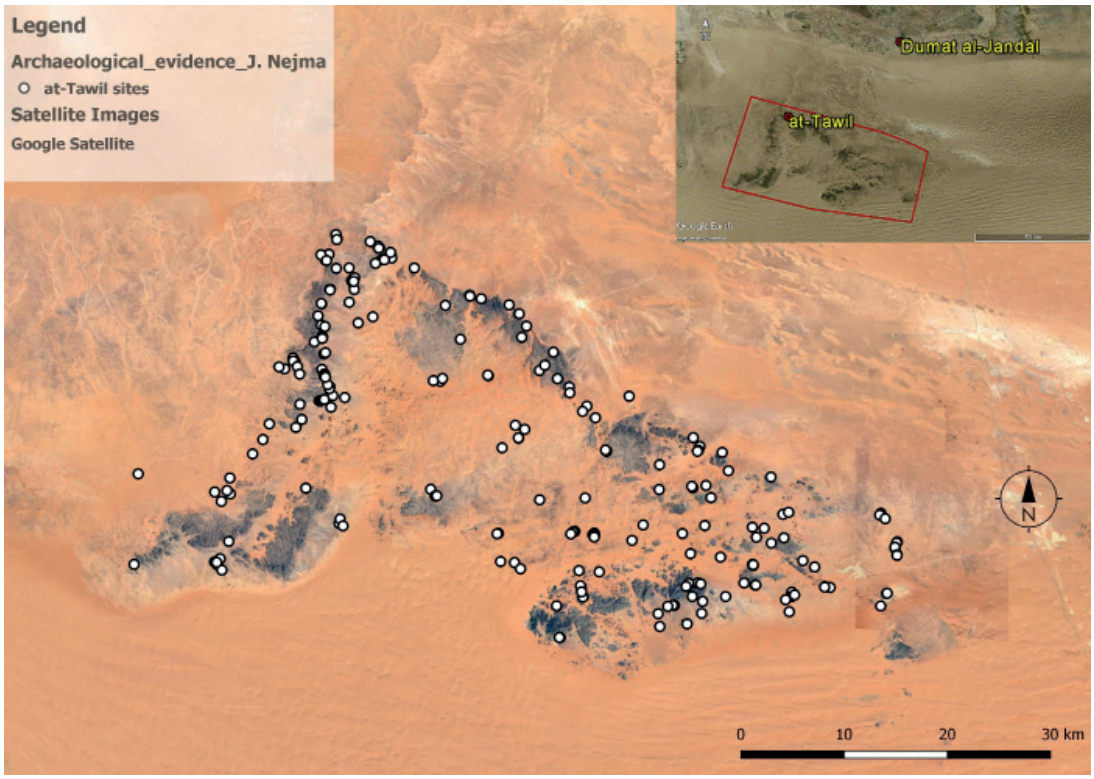


Fig. 2. Aṭ-Ṭawîl / Jabal Nejma sites (Image created with the software QGIS)

Geological chart

The information acquired and reported in the geological map lends itself to a series of preliminary observations (**Fig. 3**). This example shows the various rock formations appeared during the periods of the Devonian (416-359 million years ago), Cretaceous (145-65 million years ago), Tertiary (65-2.5 million years ago) and Quaternary (from 2.5 million years ago onwards) present in the Jawf Quadrangle 29D produced by the US Department of the Interior, Geological Survey prepared for the Ministry of Petroleum and Mineral Resources/Directorate General of Mineral Resources and revised with the use of QGIS (*Quantum* GIS) software. The color "palettes" used refer to an international standard that allows us to have a clear description of the geology of the area at first glance. The various lithotypes of soil are present in the Legend, within the geological age to which they belong. The geological map allows to observe the geological substrates of a given area and the variability of the formations; it sheds light on the nature of the environment, the geomorphology and the anthropic evidence of the environment itself.[3]

3. Terrenato & Cambi 2009: 51.

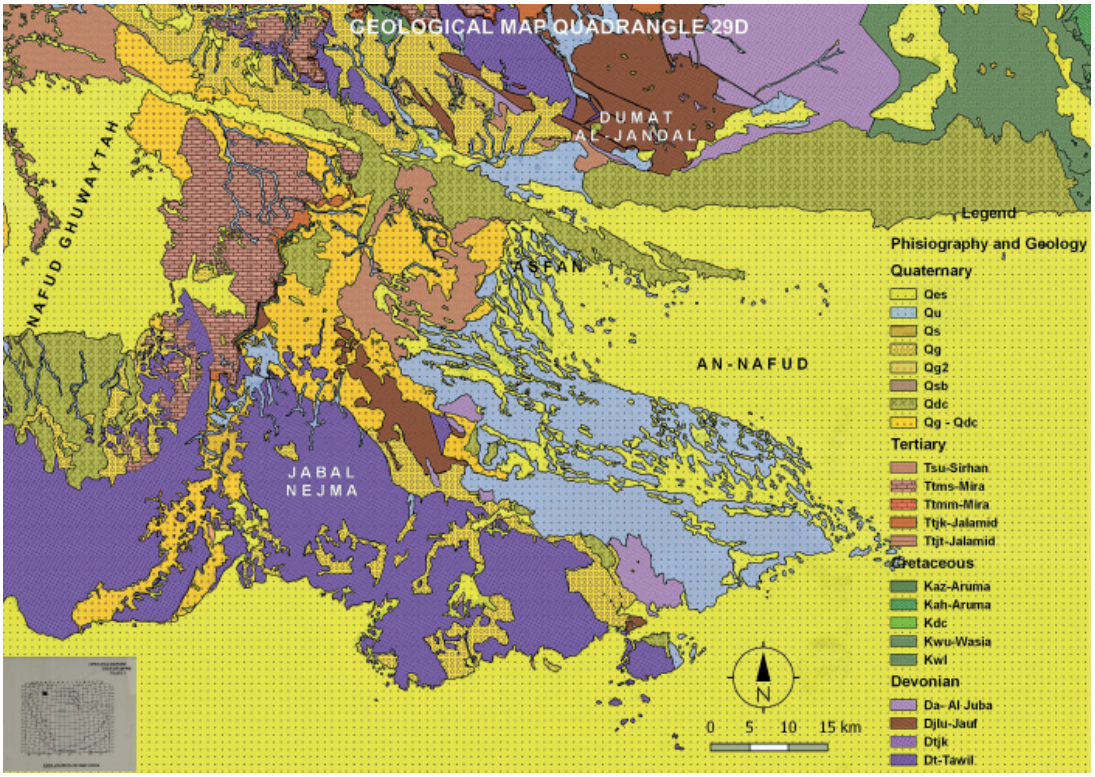


Fig. 3. Geological map made with QGIS software

Satellite images

Satellite images are not actual photographs, but records of the electromagnetic radiation received from the surface of the ground. The satellite collects the data and a computer processes them, transforming them into images for their use by the final interpreter. Remote sensing allows the observation, from a single image, of both the spatial elements (such as the shapes of the territory) and the temporal elements, represented by the natural and anthropic processes of the past, in order to reconstruct the relationships between the distribution of ancient settlements and the conditions paleo-environmental.

The geoarchaeological survey carried out in 2011 by analyzing multispectral images and subsequent field checks led to the discovery of dozens of Neolithic and Bronze Age sites on the shores of a paleo-lacustrine basin, paving the way for further investigations (**Fig. 4**).[4] During the subsequent excavation campaigns, the satellite images used by Google Earth and Terra Server software were essential to identify the sites in the volcanic area of Ḥarrat al-Ḥarraḥ, on the rock formation of aṭ-Ṭawîl (Jabal Nejma), and in Tamriyat.[5]

4. Ambrosino 2015.
5. Loreto 2016.

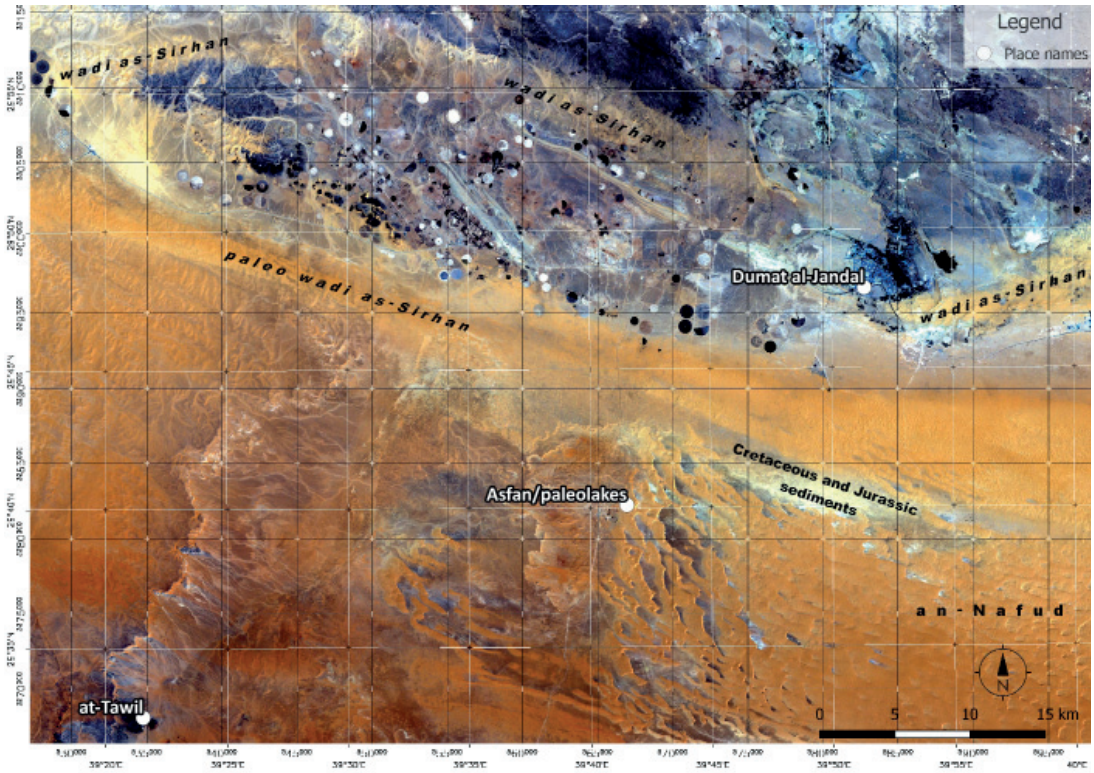


Fig. 4. False color map of the Sirḥân valley (Source: LANDSAT 7ETM, elaborated by Bruno Marcolongo)

The subsequent interpretation of the images or photo-interpretation[6] is essential to understand the environmental and landscape context of a territory. The role of the interpreter (photo interpreter) is fundamental in this process, as he evaluates the objects represented in the images, their characteristics and their mutual relationships through specific knowledge. The photointerpretation process of remote sensing data develops in four logical phases: detection, identification, classification and deduction.[7]

The detection and identification enable us to "read" the image. In this phase, once the main morphological aspects such as the *widyân* (**Fig. 5**), the paleolakes and the dunes (mainly barchan),[8] on the basis of indicators such as tonality, texture, structure and morphology, are defined, we move on to the next phases of the photointerpretation process, classification and deduction. They constitute the heart of the actual analysis of the image, allowing to extract further information on the elements identified and their spatial and temporal relationships. This method also cannot be separated from the acquisition of data on the ground to be compared with the information extrapolated from remote sensing images.[9]

6. By photointerpretation we mean a qualitative analysis of remotely sensed data in which human interpretative ability allows "the passage from data to information" (Dainelli 2011: 31).
7. Marcolongo & Simone 2011: 19.
8. The barchan are mobile dunes with a crescent shape, an asymmetrical transverse profile and the convex face above the wind, while the concave face is below the wind. They are common in sandy deserts and clearly form in the presence of constant, unidirectional winds.
9. Marcolongo & Simone 2011: 19.

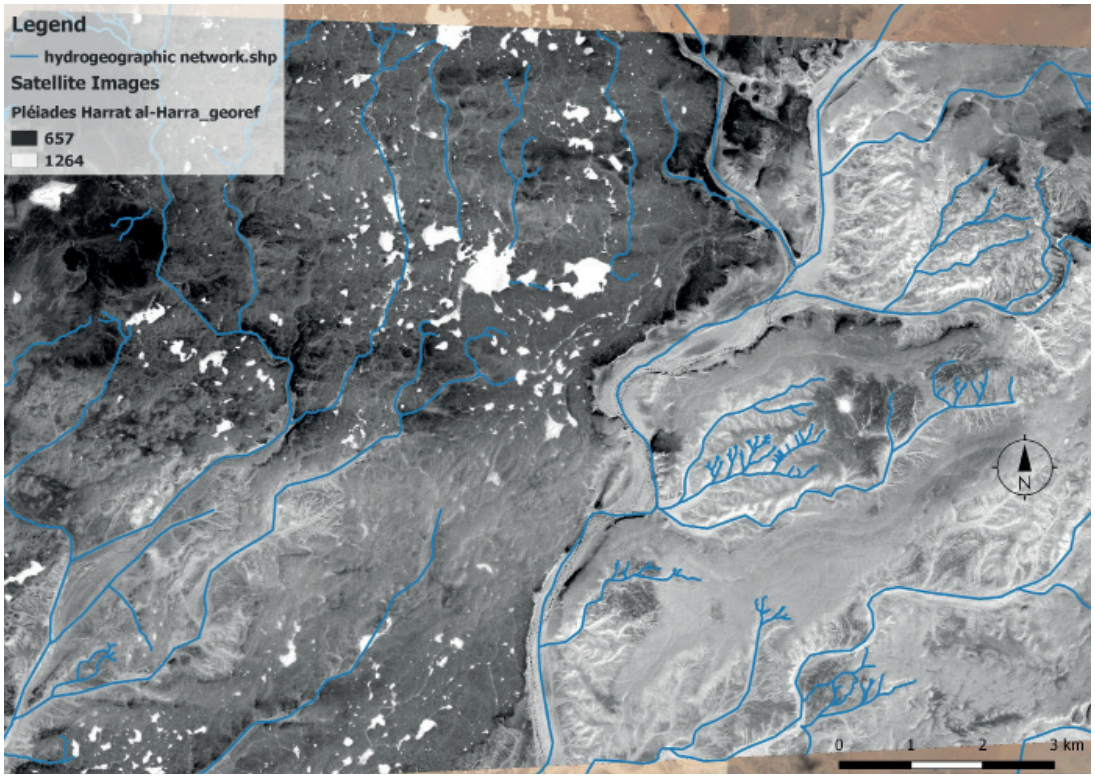


Fig. 5. Ḥarrat al-Ḥarraḥ, widyân (Image created with QGIS software)

The thematic data obtained from the images show two types of settlements: those of Ḥarrat al-Ḥarraḥ and those of aṭ-Ṭawîl. The first area is characterized by basaltic lava flows, while the second is occupied by the rocky outcrops of sandstone where the semi-nomadic communities of kite builders settled, in a period ranging from the Pre-Pottery Neolithic B (PPNB) to the Chalcolithic/Bronze Age. In these areas the anthropic structures such as kites, compounds, single structures, tombs, etc., are mainly placed along the edges of the watercourses (*widyân*), while the occurrences of nomadic people in the Aṣfân region are characterized, during the Neolithic, by lake basins fed by perennial rivers, dated to the 4th millennium BC, which provided a great resource of animals and plants for hunter-gatherer communities.[10]

Aerial photographs

Aerial photographs are made with photogrammetric equipment, placed on specially modified airplanes. This is the oldest and most frequently used method of remote sensing; photos can be used to create detailed maps providing an instant visual inventory of a portion of the earth's surface. The photogrammetric process produces geometrically accurate photographs, which are then used to describe the precise morphology of the "structures".

10. Loreto 2017: 61.

For example, the area around the excavation of the castle of Mârid, located in an urban context, was investigated through photo-interpretation of aerial shots (an orthophoto from 1948 and aerial photographs from 1964), which show a different use of the land over time and the extension of the ancient settlement (**Figs. 6 and 7**).[11]

From a series of photos taken it is possible to produce topographic maps based on a series of stereoscopic models resting on some relief points on the ground. The date and information on the footage (flight height, focal distance, time of day, progressive number) appear in the margin on the so-called "data strip".[12] This study was implemented with a GIS platform in which the data obtained from the interpretation of satellite images, from field surveys and from the reading of geological maps were merged, following an integrated geo-archaeological approach.

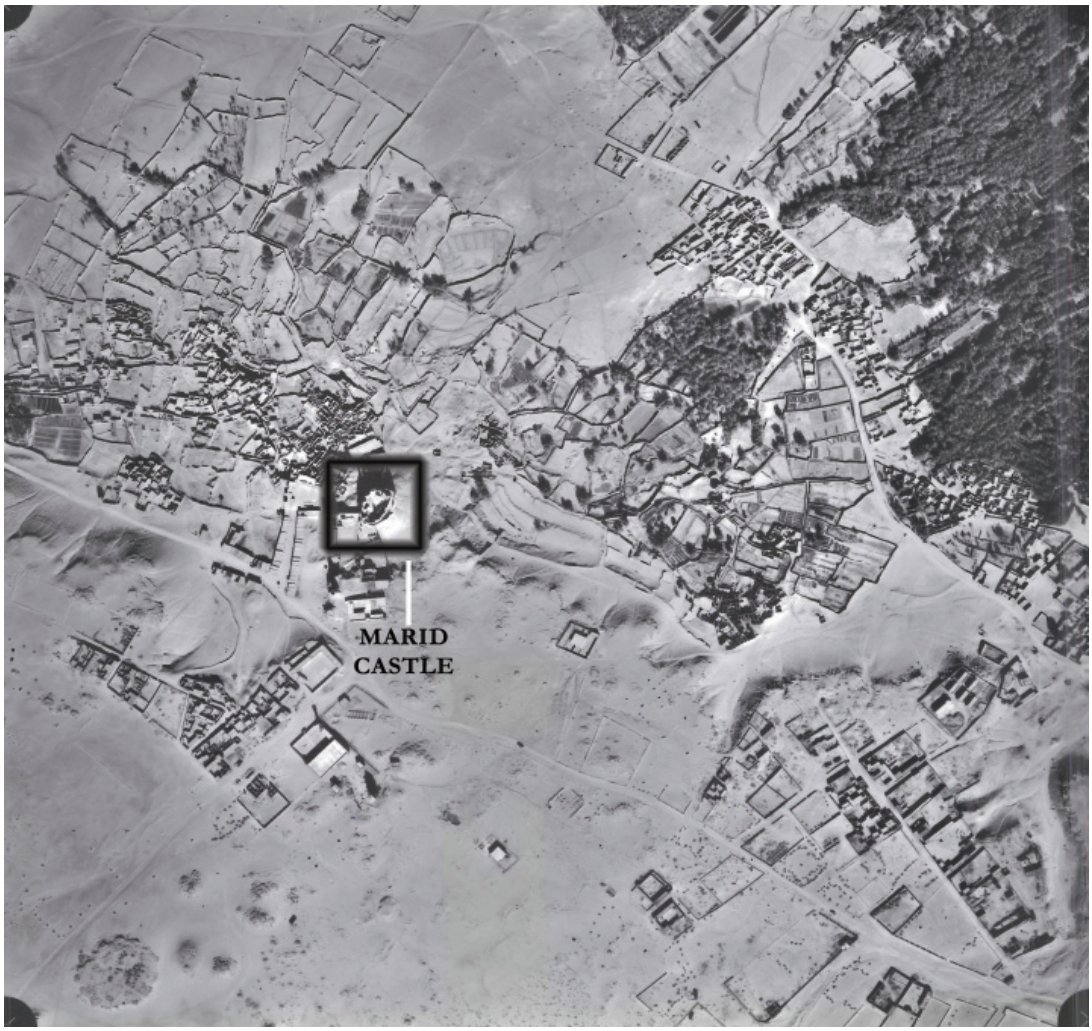


Fig. 6. Dûmat al-Jandal. 1948 Aerial picture (courtesy Hussein al-Khalifa)

11. Marcolongo 2017: 23.

12. Hassan & Hatchinson 1992: 128-129.

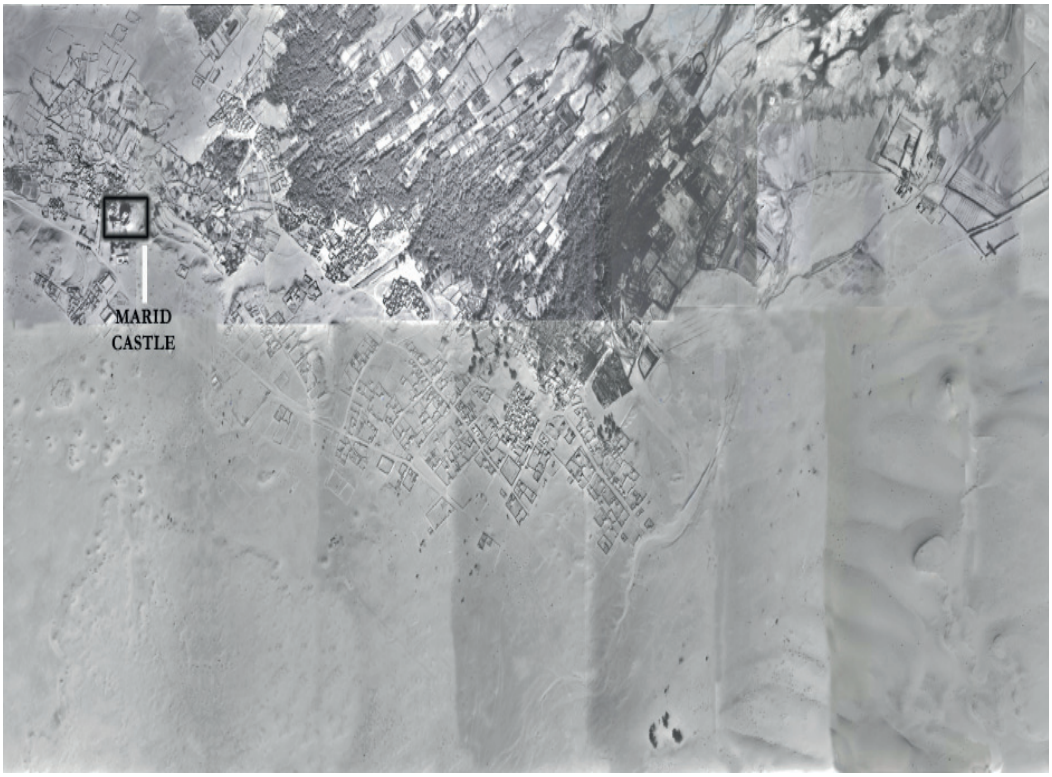


Fig. 7. Al-Jawf fotomosaic, 1964 (courtesy Hussein al-Khalifa)

Towards a Geo-archaeological synthesis

For the detailed geoarchaeological analysis, the most recent geological map of quadrant 29D (**Fig. 3**) and 30C (**Fig. 8**), was therefore integrated into the satellite images and field analysis, to understand the close relationships between ancient settlements patterns and environmental physical parameters. The geological map of quadrant 29D includes the area of Dûmat al-Jandal, aṭ-Ṭawîl and Aṣfân while quadrant 30C includes the Ḥarrat al-Ḥarraḥ area, also built by the U.S. Department of the Interior, Geological Survey prepared for the Ministry of Petroleum and Mineral Resources. The 29D quadrant is delimited by the 29 and 30 degrees of Latitude and the 39 and 40.50 degrees of Longitude, while the 30C quadrant is delimited by the 30 and 31 degrees of Latitude and the 37 and 39 degrees of Longitude.These were first georeferenced and then digitized within the QGIS software and each formation was assigned a color, which refers to an international standard, based on the different varieties of rock formations that formed during the different geological eras. A shapefile has been created for each formation and the sfollowing two lists present the various formations associated with the respective geological Ages of quadrants 29D and 30C.

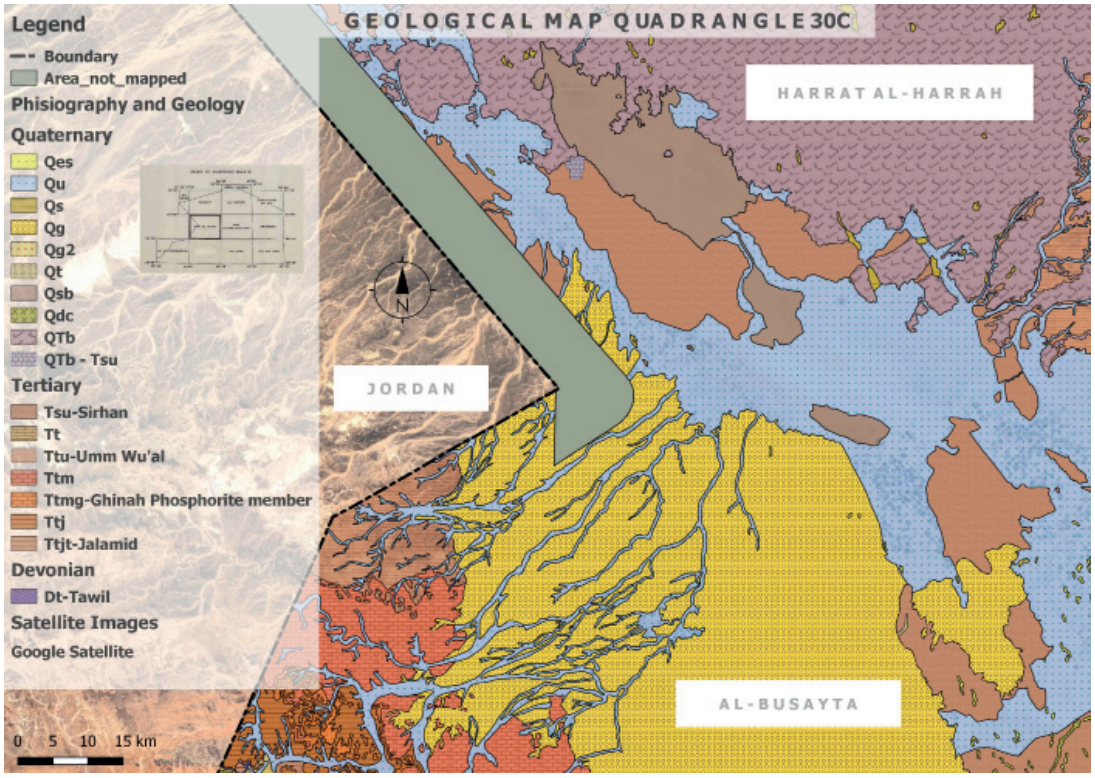


Fig. 8. Geology of Quadrant 30C (Image made with QGIS software)

Legenda, Quadrangle 29D

Era: QUATERNARY (2,58 Ma – Present)

- ***Qu:*** ALLUVIUM-unconsolidated silt, sand, and gravel found along wadî courses, depression and basins
- ***Qs:*** SILT AND CLAY-In undrained depression forming flat surface commonly void of vegetation
- ***Qsb:*** SABKHA DEPOSITS-Salt encrusted silt, clay, and muddy sand in playa-like depression
- ***Qes:*** EOLIAN SAND-Mostly stabilized sand dunes and discontinuous sand cover
- ***Qg:*** GRAVEL-Fans and outwash plains consisting primarily of chert clasts and siliceous limestone fragments; also found in drainage channels
- ***Qg2:*** REGOLITH GRAVEL-Semi-consolidated gravel derived from residual material
- ***Qg/Qdc:*** GRAVEL AND DURICRUST-Gravel covered duricrust where Qdc gravel is derived from disintegrated duricrust
- ***Qdc:*** CALCAREOUS AND GYPSIFEROUS DURICRUST- Discontinuous mantles bedrock

- ***Unconformity*** [13]

Era: TERTIARY (66-2,58 Ma)

- ***Tsu:*** SIRHAN FORMATION- Multicoloured sandstone and shale with interbeds of sandy limestone

- ***Unconformity***
-
- **MIRA FORMATION (Ttm):**
- ***Ttms:*** Sib member-Interbedded silicified limestone and chert containing thin phophorite beds
- ***Ttmm:*** Mindassah member-Bioclastic limestone with Nummulic beds

- ***Unconformity***

- **JALAMID FORMATION (Ttj)**
- ***Ttjk:*** Kuwaykabah member-Partly sandy limestone with interbeds of shale, includes chert lenses and nodules
- ***Ttjt:*** Thaniyat Phosphorite member-Phosphorite, sandy limestone, shale, and chert

Era: MESOZOIC

Period: CRETACEOUS (145-65 Ma)

- **ARUMA FORMATION (Ka)**
- ***Kaz:*** *Zallum member-Friable, multicolored sandstone and shale. Local quartzite bed near top; cobble bed near base*
- ***Kah:*** Hudayb member-Limestone, partly dolomitic, algal, and fossiliferous

- ***Unconformity***

- **WASIA FORMATION (Kw)**
- ***Kwu:*** Upper member-Friable sandstone and claystone; lenticular veneer of lateritic sandstone, siltstone, and mudstone at top

13. It is a separation surface between two lithological units that represents a significant interruption in sedimentation. A general stratigraphic discontinuity is defined (http://geobalocchi.blogspot.it/2010/09/rapporti-stratigrafici.html).

- ***Disconformity*** [14]
- ***Kwl:*** Lower member-Sandstone, silty shale, and mudstone

Era: PALEOZOIC

Period: DEVONIAN (416-359 Ma)

- ***Unconformity***

- ***Da:*** AL JUBAH FORMATION – Sandstone interbedded with silty and sandy shale, includes minor interbeds of siltstone. Contains Devonian index fossil Prototaxites
- **JAWF FORMATION (Dj)**
- ***Djlu:*** Upper and Lower member combined – Upper member – limestone, shale and sandstone; limestone contains algal, biohermal, and stromatolitic intervals; shale, gypsiferous. Lower member – shale and siltstone, gypsiferous, with interbeds of sandstone and argillaceous limestone; thin-bedded limestone toward base contains reef mounds
- ***Dt:*** TAWIL FORMATION – Sandstone with quartz pebbles; ferruginous
- Legenda Quadrangle 30C

Era: QUATERNARY (2,58 Ma – Present)

- ***Qes:*** AEOLIAN SAND- stabilized dunes
- ***Qu:*** ALLUVIUM-unconsolidated silt, sand, and gravel
- ***Qs:*** SILT AND CLAY-fill undrained depressions
- ***Qg:*** GRAVEL- mostly composed of chert pebbles
- ***Qt:*** TERRACE-elevated *wâdî* deposits of sand and gravel
- ***Qsb:*** SABKHA DEPOSITS-Salt encrusted clay, silt, and sand
- ***Qdc:*** CALCAREOUS AND GYPSIFEROUS DURICRUST
- ***QTb:*** ALKALI-OLIVINE BASALT-forms lava flows and cinder cones
- ***QTb/Qg:*** Alkali-olivine basalt with veneer of basaltic gravel and sand
- ***Tsu:*** SIRHAN FORMATION-calcareous sandstone and limestone
- ***QTb/Tsu:*** Sirhan Formation with basalt interbeds

14. Stratigraphic discontinuities produced through the subaerial erosion of emerged rocks due to the lowering of the sea level and not accompanied by tectonic deformations (http://geobalocchi.blogspot.it/2010/09/rapporti-stratigrafici.html).

- ***Unconformity***

Era: TERTIARY (66-2,58 Ma)

- **Turayaf Group (Tt)**
- ***Ttu:*** UMM WU'AL FORMATION-includes Shihiyah members (Ttus), Muqanna coquina bed (Ttus [B]), Tarbah member (Ttut), Al Hanad member (Ttua), and Hidrij member (Ttuu)
- ***Ttus:*** Shihiyah members-limestone containing chert nodules
- ***Ttus (B):*** Muqanna coquina bed-coquina and shells
- ***Ttut:*** Tarbah member-bioclastic, nummulitic limestone
- ***Ttuh:*** Hamad member-bedded limestone containing thin chert beds
- ***Ttua:*** Al Amud member-limestone and claystone; intermittent opal claystone; coquina at top
- ***Ttup:*** Arqah Phosphorite member-limestone and phosphorite
- ***Ttuu:*** Hidrij member-
- **[L]** Ribbon banded limestone and chert
- **[B]** Silty limestone and claystone; partly bioclastic
- **[S]** Fissile shale and dolomitic limestone

- ***Disconformity***

- **Turayaf Group (Tt)**
- ***Ttm:*** MIRA FORMATION-includes the Sib member (Ttms) and Hawsa member (Ttmh)
- ***Ttms:*** Sib member-interbedded limestone and chert
- ***Ttmh:*** Hawsa member-interbedded limestone and claystone containing chert and geodes; includes Mindassah member
- ***Ttmg:*** Ghinah Phosphorite member-limestone and thin phosphorite beds; fissile shale
- ***Ttj:*** JALAMID FORMATION-includes the Kuwaykabah member (Ttjk) and the Ghuqzy [B] and Qutayfah [L] beds Ttjk: Kuwaykabah member
- **[B]** Ghuzay bed-bioclastic limestone
- **[L]** Qutayfah bed-limestone with chert nodules and lenses
- ***Ttjt:*** Thaniyat Phosphorite member-phosphorite, limestone and chert

- ***Disconformity***

Era: MESOZOIC

Period: CRETACEOUS (145-65 Ma)

- ***Kaz:*** ARUMA FORMATION-Zallum member-argillaceous limestone and shale
- ***Ku:*** CRETACEOUS ROCKS, UNDIVIDED-limestone and shale

- ***Unconformity***

Period: PERMOTRIASSIC (252-201 Ma)

- ***TrPs:*** SUDAIR SHALE-reddish grey and reddish brown shale

- ***Unconformity***

Era: PALEOZOIC

Period: DEVONIAN (416-359 Ma)

- ***Dt:*** TAWIL FORMATION – sandstone with quartz pebbles. Minor interbeds of shaly sandstone

- ***Unconformity***

Period: SILURIAN (443-416 Ma)

- ***St:*** TAYYRAT FORMATION-shale and siltstone, sandy near top

Shapefiles are vector layers that represent discrete features in space in the form of points, lines and polygons. They represent static and immutable entities as they do not contain spatial or temporal information[15].

In our case, to digitize the various geological formations, the shape of the polygon was chosen, using a color grid according to the geological classification of the land. To create a GIS model that includes both anthropic structures and paleo-environmental aspects, it was necessary to purchase 1:200,000 scale topographic maps of the survey areas (**Fig. 9**).

15. Rogers Staub 2013: 5-6.

These maps made by the Soviet army, between 1975 and 1987, acquired from the site http://www.omnimap.com show us a dense hydrographic network. The georeferencing of the maps and the subsequent digitization of the watercourses (*wâdî and šeib*) according to the Horton method modified by Strahler (1958), went further to implement the GIS.

Once the data was entered into the QGIS software, it was possible to create connections between the related archives that would otherwise be very problematic. Such connections occur with spatial queries in order to understand the distribution model of the sites and the settlement dynamics of the areas under investigation.

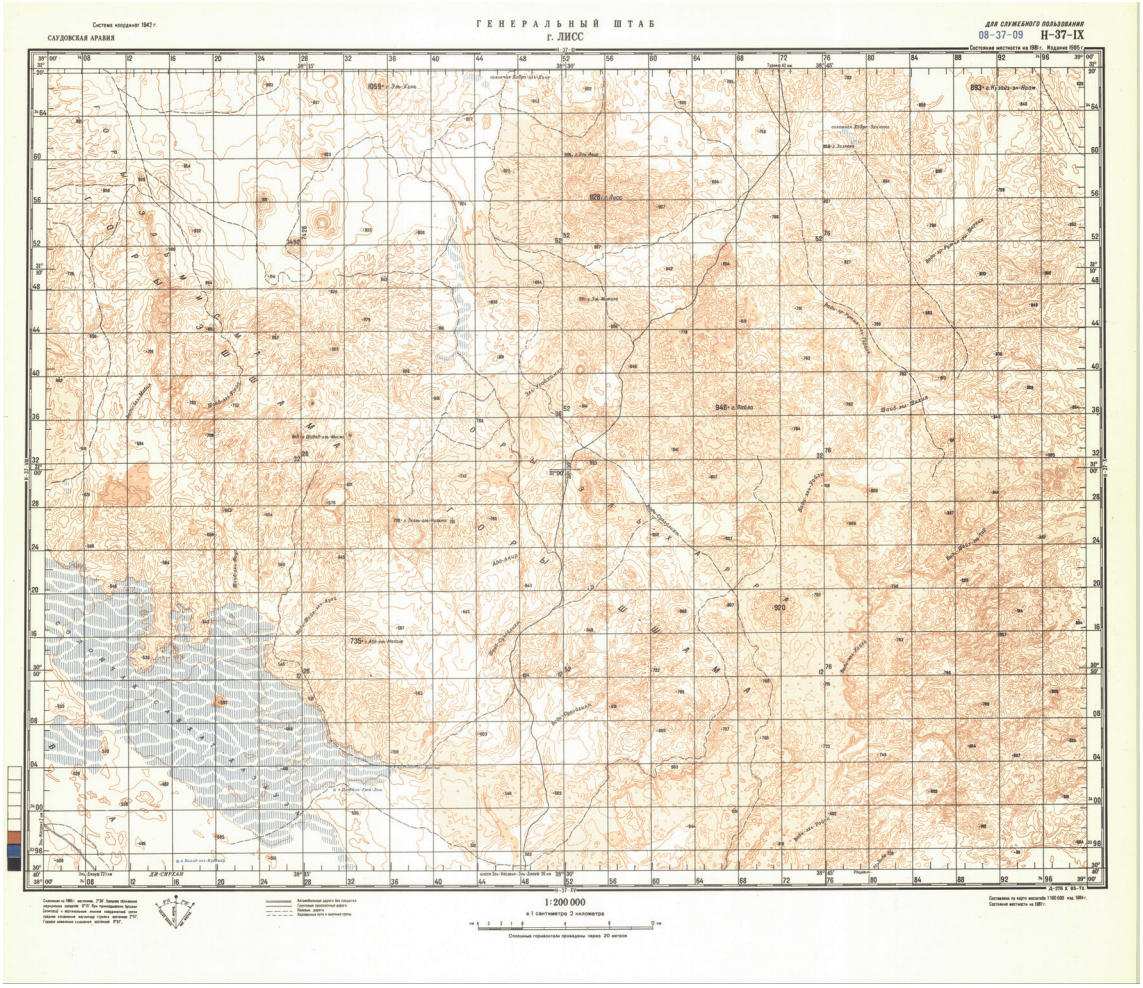


Fig. 9. Topographic map H-37-9

The areas of investigation: aṭ-Ṭawīl and Ḥarrat al-Ḥarraḥ

The structures identified on the mountains of aṭ-Ṭawîl and on the Ḥarrat al-Ḥarraḥ indicate intense human occupation during the Holocene. The main evidence gathered dates back to an economy that uses complex structures. Their function, still debated, is linked to adaptation strategies in an increasingly arid environment and therefore rich in wide open spaces: kites, compounds (or agglomerated structures), tombs, "U-shaped" and "meander" structures. We find the same evidence not only in the deserts of Saudi Arabia but also in Jordan, Syria, Israel, Turkey, Egypt and Yemen, on the Ustyurt plateau between Kazakhstan and Uzbekistan and on the Aragats mountains in Armenia.[16]

aṭ-Ṭawîl

The aṭ-Ṭawîl mountains cover an area of 38x72 km, located 50 km southwest of Dûmat al-Jandal. The inverted U shape of the mountain formation is completely surrounded by alluvial sediments and Quaternary sand. The mountains were crossed by seasonal rivers (*widyân*), as evidenced by the traces of gravel, sand and silt. On the crest of the mountains in the aṭ-Ṭawîl area, the geological formation with the same name is made up of silicized quartzite sandstone and ferruginous keratin breccia. The silicification and the formation of iron oxides were probably caused by secondary solution processes and oxidation due to a long period of exposure to atmospheric agents.[17]

After a preliminary inspection using Remote Sensing, field investigations were conducted to investigate the identified structures. These investigations were designed by drawing the route on topographic maps, and following the traces of the al-Bedu communities in the northern Nafûd (**Fig. 10**).

The anthropic evidence recognized through Remote Sensing are the following:

- 140 Compounds (or cluster structures **Fig. 11**)
- 42 Single Structures: those structures that have a distance of more than 20/25 meters from each other (**Fig. 12**)
- 14 Kites (**Fig. 13**)
- 17 Tombs (**Fig. 14**)
- 7 Undefined objects: this category also includes "U-shaped" structures (**Fig. 15**)

16. Crassard *et al.* 2015.
17. Meissner *et al.* 1989: 8-9.

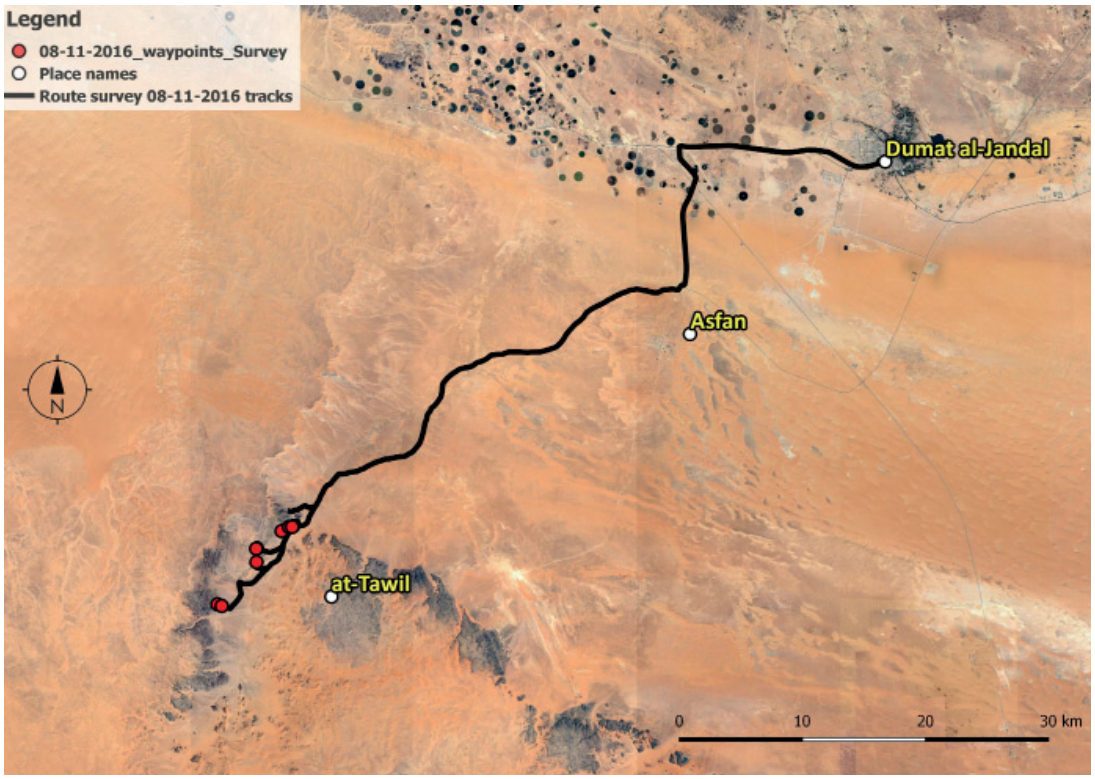


Fig. 10. Example of Survey path (Image created with QGIS software)

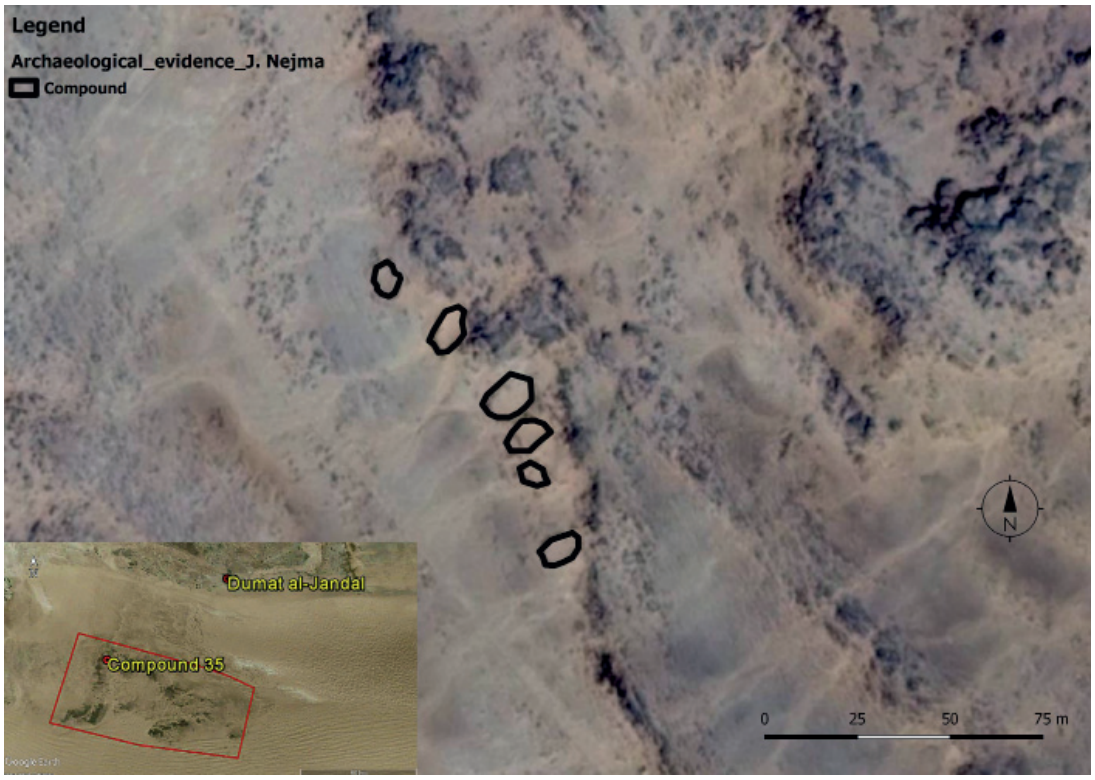


Fig. 11. Compound on the aṭ-Ṭawîl (Image created with QGIS software)

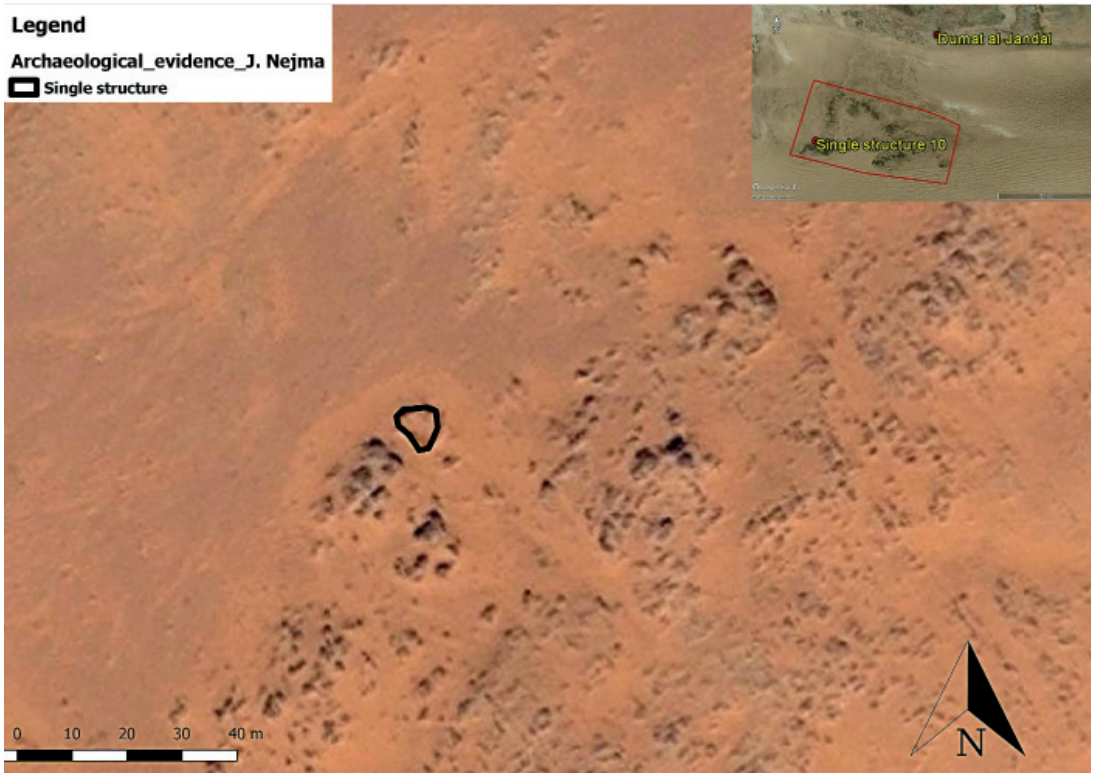


Fig. 12. Single structure on the aṭ-Ṭawîl (Image created with QGIS software)

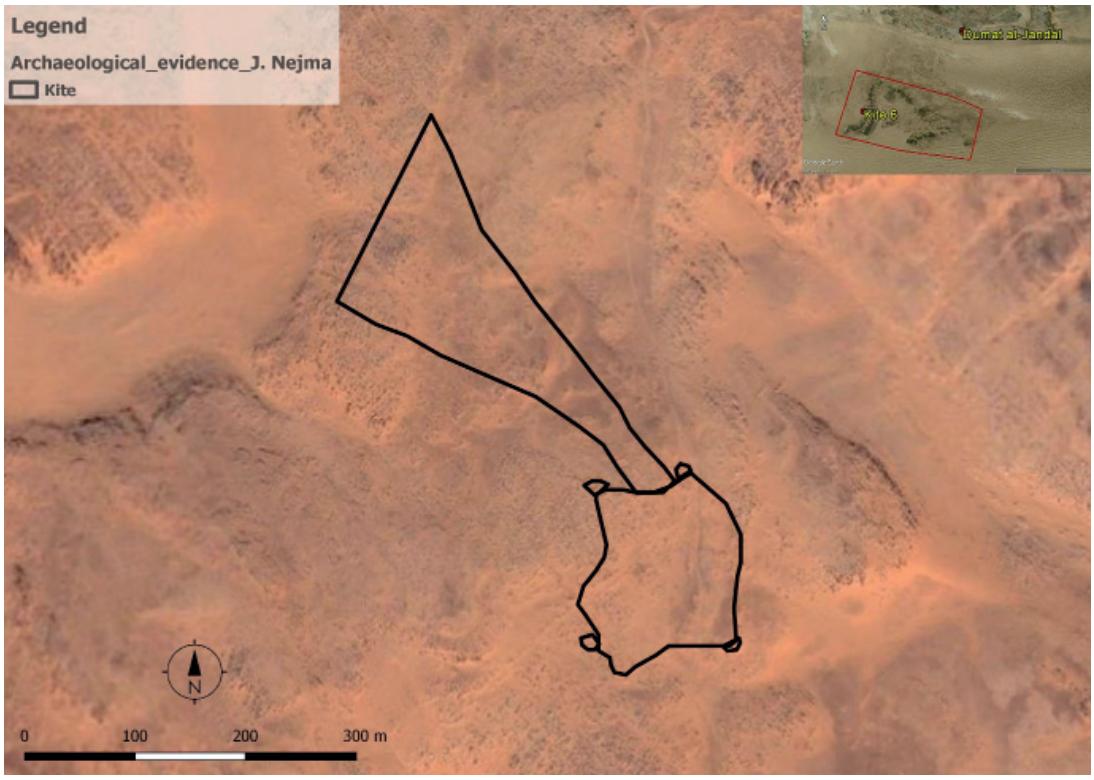


Fig. 13. Kite on the aṭ-Ṭawîl (Image created with QGIS software)

Fig. 14. Tomb on the aṭ-Ṭawîl (Image created with QGIS software)

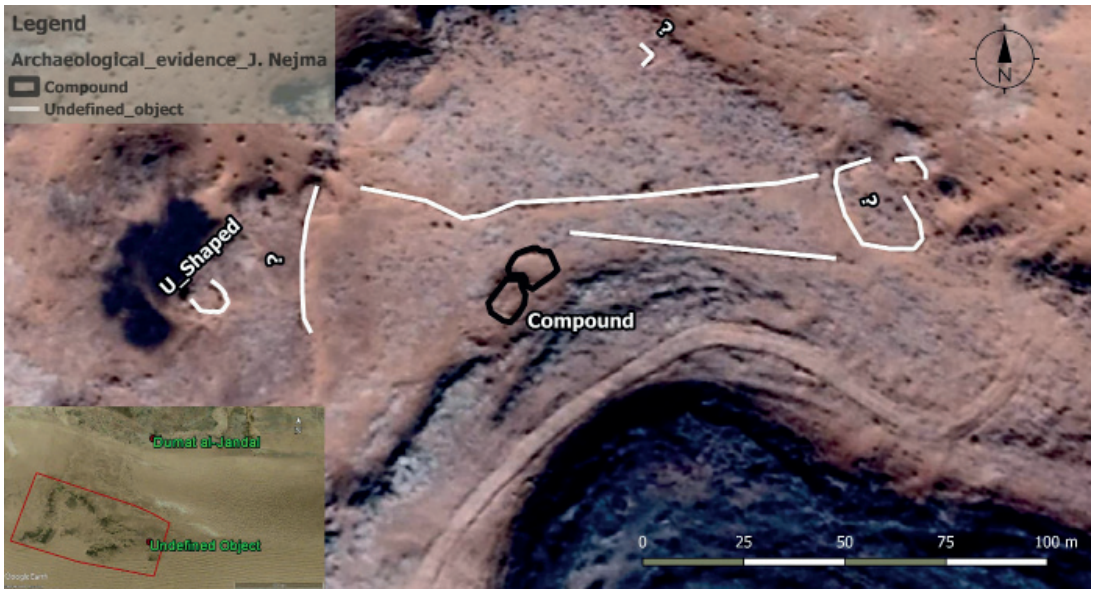


Fig. 15. Undefined structures and a Compound on the aṭ-Ṭawîl (Image created with QGIS software)

Ḥarrat al-Ḥarraḥ

The volcanic field in question has a width of between 80 and 100 km from the northwestern region of Saudi Arabia to Jordan. In some points the basalt, by incorporating pyroclastic rocks, sills, embankments, plugs and cones, becomes scoriaceous and vesicular. State that the predominant way to distinguish them was the fissural (or linear) eruption followed by the formation of the pyroclastic cone. Pahoehoe or AA flows are present but the mechanics of atmospheric agents have destroyed their main characteristics. Explosive eruptions associated with large, low-relief craters (known as "maars") have unearthed fragments of underlying sedimentary rocks. The analyzes carried out on the basalt of the Ḥarrat al-Ḥarraḥ indicate that it is alkaline-olivine basalt as a result of a volcanism linked to continental cracks. The age of al-Ḥarraḥ basalt flows spans within the Tertiary and Quaternary eras.[18]

The study of Ḥarrat al-Ḥarraḥ north of Wâdî as-Sirhân is based on a sample area of 11x16 km (**Fig. 16**). Since it was not possible to carry out surveys in this area, the anthropic structures were identified only by remote sensing (GIS software, Google Earth and Terra Server and Landsat ETM images). The anthropic evidence of the investigated sample is divided as follows:

- 157 Compounds (**Fig. 17**)
- 5 Kites (**Fig. 18**)
- 155 Single Structures (**Fig. 19**)
- 23 Tombs (**Fig. 20**)
- 79 Undefined Objects: Meander walls are also present in this category (**Fig. 21**)

18. Meissner *et al.* 1990: 18-19.

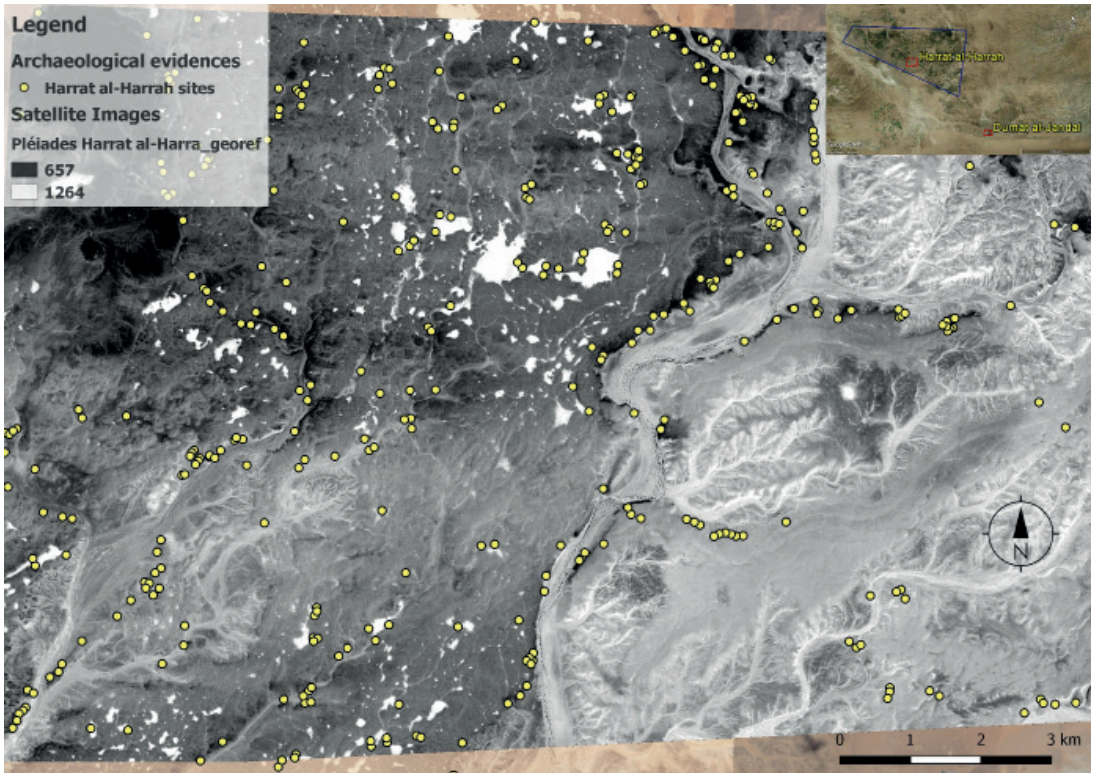


Fig. 16. Sites identified in the 11x16 km sample from Ḥarrat al-Ḥarraḥ north of Wâdî as-Sirḥân (Image created with QGIS software)

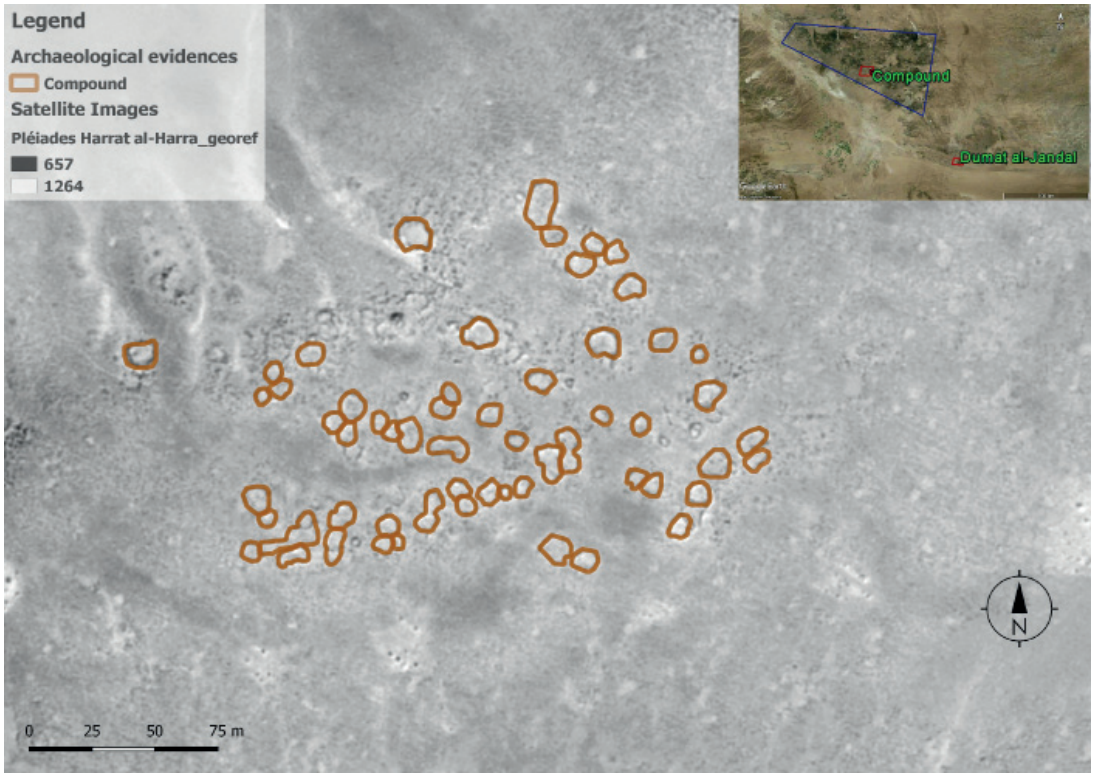


Fig. 17. Compound on the Ḥarrat al-Ḥarraḥ (Image created with QGIS software)

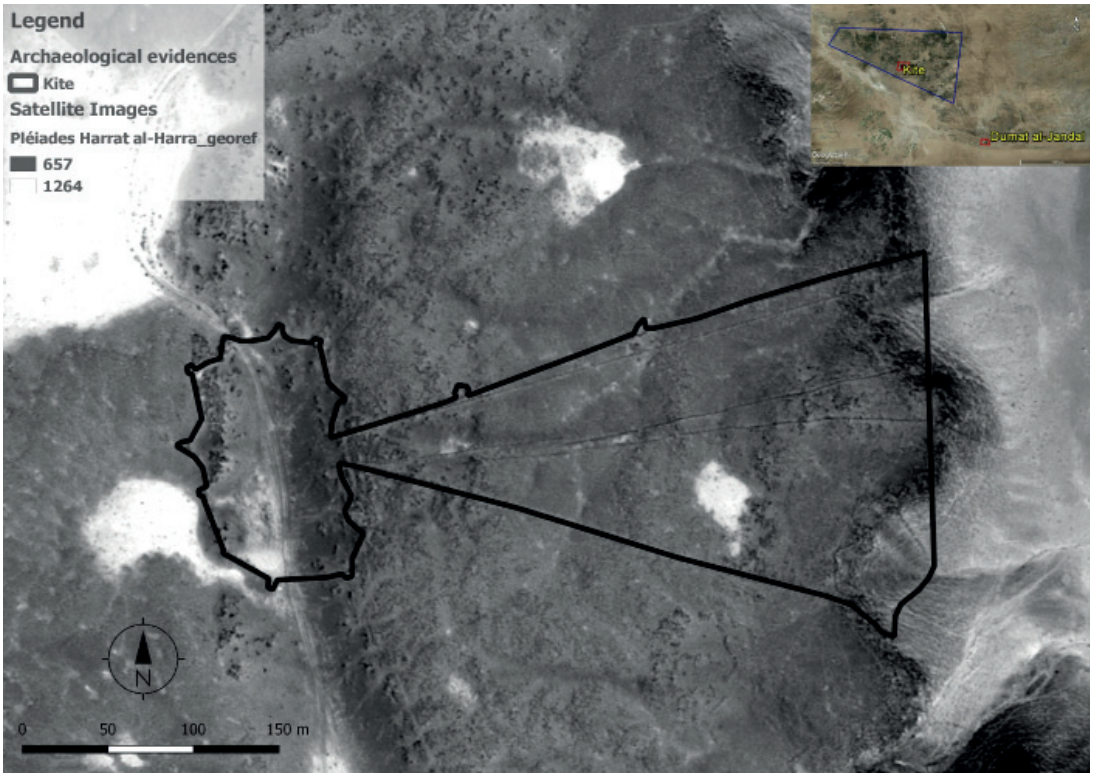


Fig. 18. Kite (Image created with QGIS software)

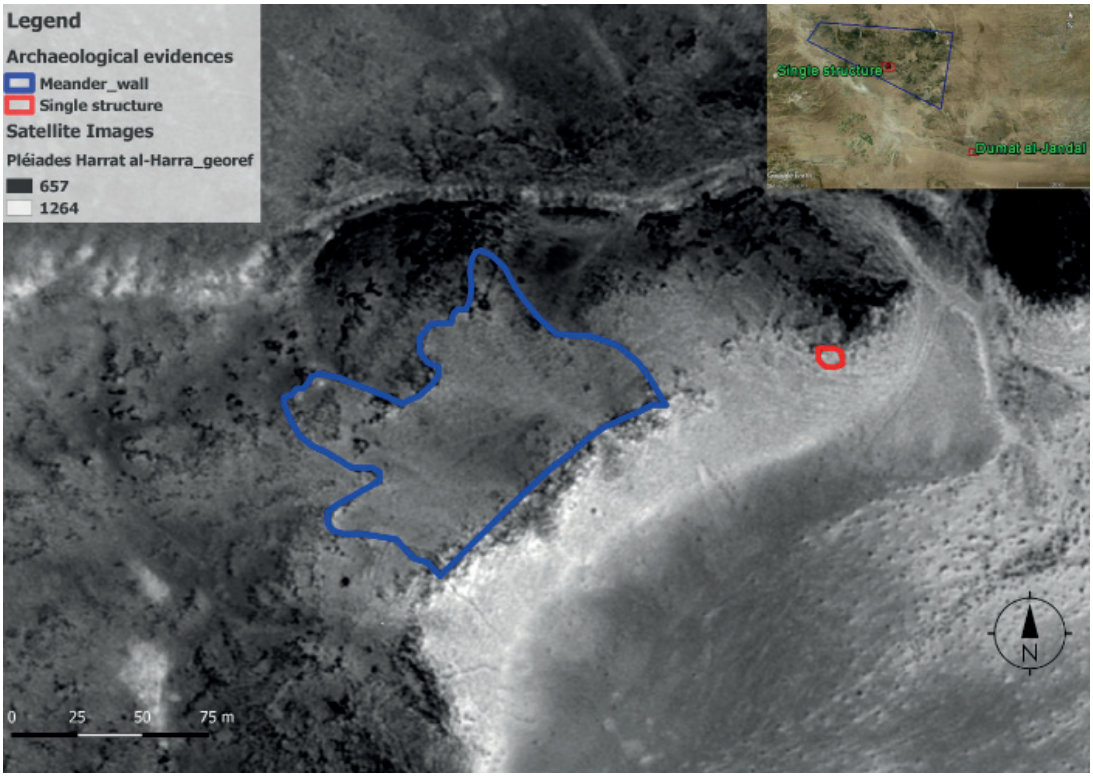


Fig. 19. Single structure and Meander wall on the Ḥarrat al-Ḥarraḥ (Image created with QGIS software)

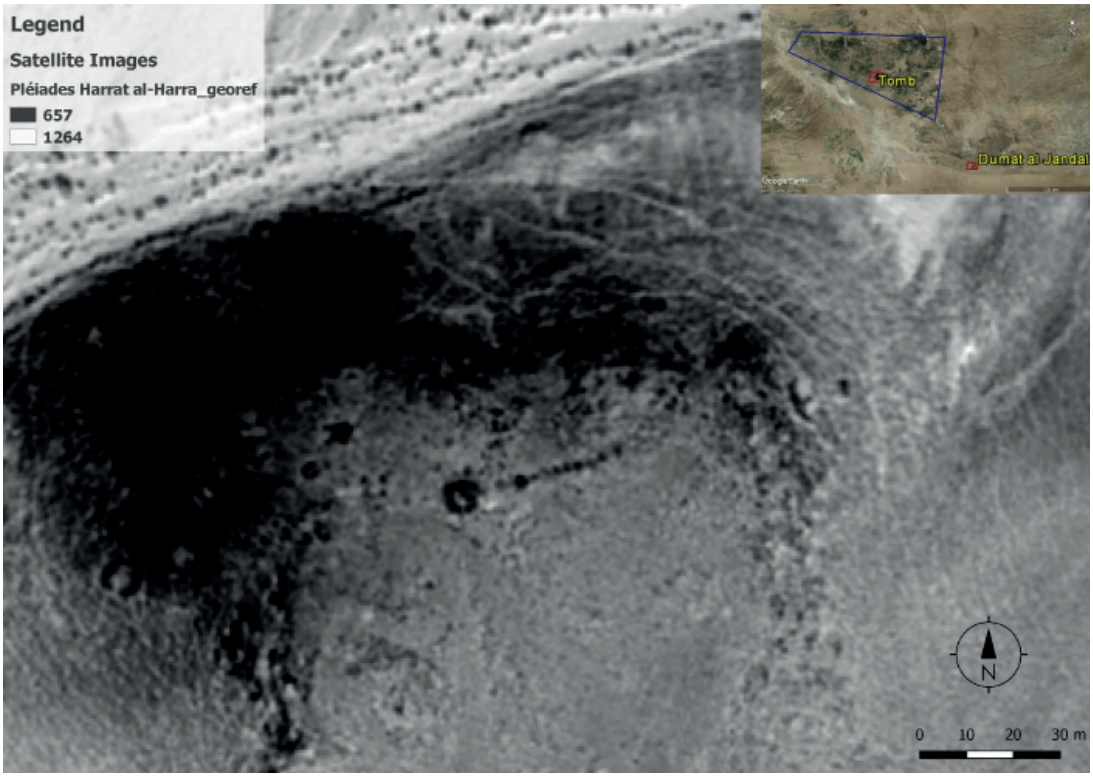


Fig. 20. Tomb on the Ḥarrat al-Ḥarraḥ (Image created with QGIS software)

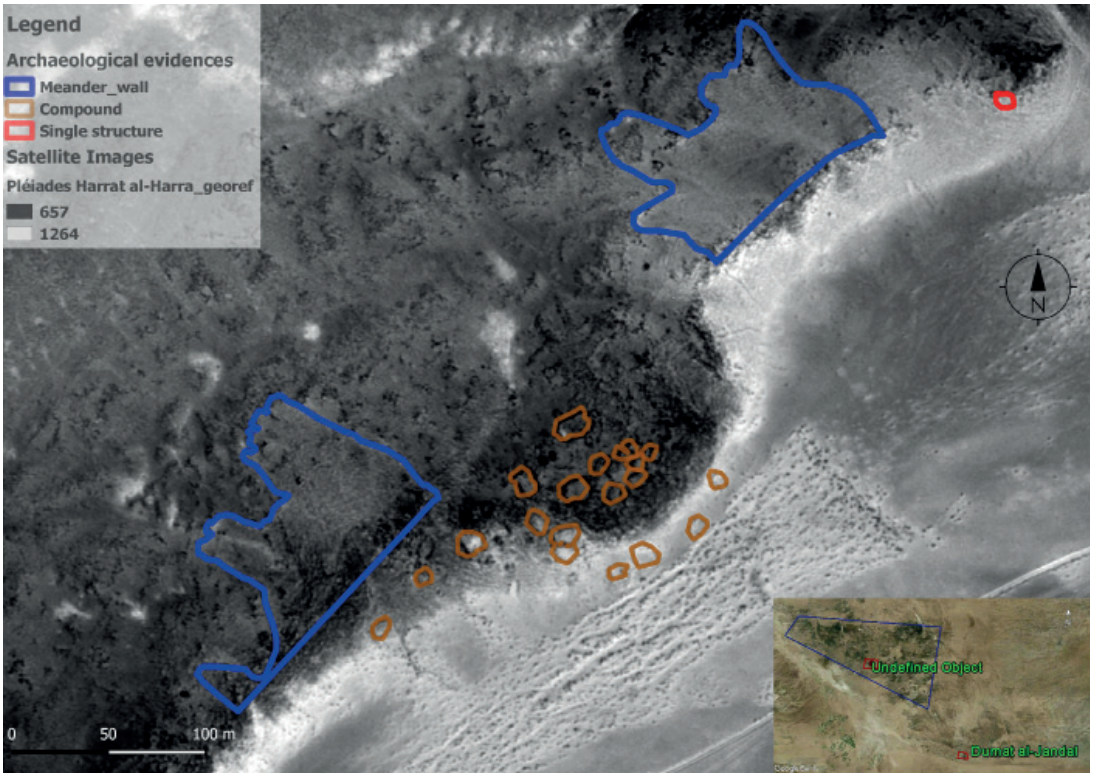


Fig. 21. Meander walls on the Ḥarrat al-Ḥarraḥ (Image created with QGIS software)

Data obtained and preliminary results

Relationships between the anthropic structures and the geological formations

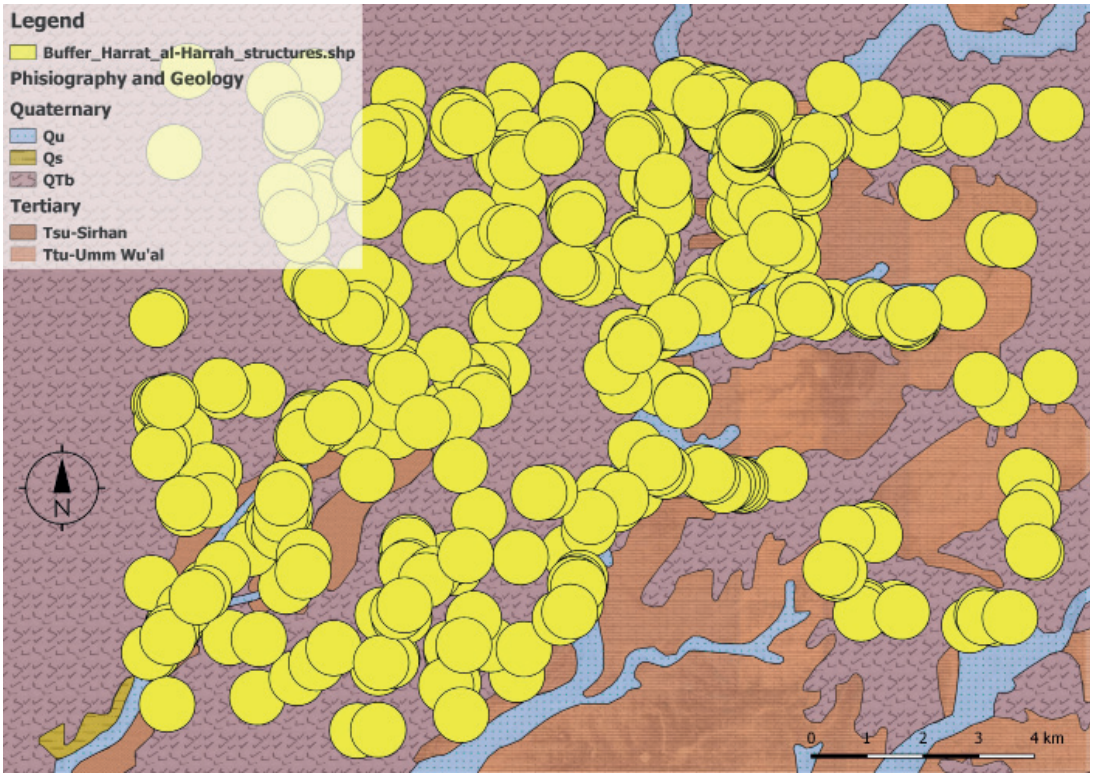


Fig. 22. 500 m Buffer applied to the structures of the Ḥarrat al-Ḥarraḥ (Image created with QGIS software)

To the 220 anthropic structures identified in the aṭ-Ṭawîl and to the 419 identified in the Ḥarrat al-Ḥarraḥ sample, a 500-meter Buffer was first applied (measure chosen to incorporate the anthropic evidence and the pertinent areas closest to them) and were subsequently related to the geology of the place they belong to (**Fig. 22**).

The data obtained from the query revealed that in the area of aṭ-Ṭawîl almost all of the anthropic structures (204 out of 220) belong to the sandstone formation (Dt-Tawil formation);

51 on or near alluvial plains consisting mainly of flint clasts and fragments of siliceous limestone, also found in drainage channels (Qg); 10 in the formation composed of silt and sandy shale with siltstone inclusions (Da); 68 in Qg/Qdc, the gravel (Qg) that covers the limestone crust (Qdc); 14 by the sandy deposits (Qes); 37 in alluvial deposits formed by unconsolidated silt, sand and gravel (Qu) located along the wydiân courses, in depressions and basins.

On the Ḥarrat al-Ḥarraḥ the anthropic structures are located near the QTb formation (alkaline-olivine basalt formed as a result of lava flows and ash cones) which in the considered sample covers the largest surface; 193 structures are located near alluvial deposits consisting of sand, rock and unconsolidated silt (Qu); 1 is located in the formation composed of clay and silt (Qs); 59 are present in the formation consisting of calcareous sandstone and limestone (Tsu-Ṣirhân); 168 are included in the formation of limestone, clay and flint (Ttu-Umm Wu'al).

The presence within the composition of some geological formations (Qg, Qg/Qdc, Ttu, Ttms, Ttjk, Ttjt) of flint, the preferred material for building hunting or everyday tools, has determined a query in relation to the anthropic structures. The query led to two observations: 1) Kites and Meander walls as shown in the image (**Fig. 23a and 23b**) were almost all built, both for the aṭ-Ṭawîl area (kites only) and for the investigated Ḥarrat al-Ḥarraḥ area, nearby or on geological formations that contain flint; 2) anthropic structures in the aṭ-Ṭawîl area are placed on or near formations containing flint (**Fig. 24**) while on the Ḥarrat al-Ḥarraḥ they are distributed along the whole basaltic flow (QTb).

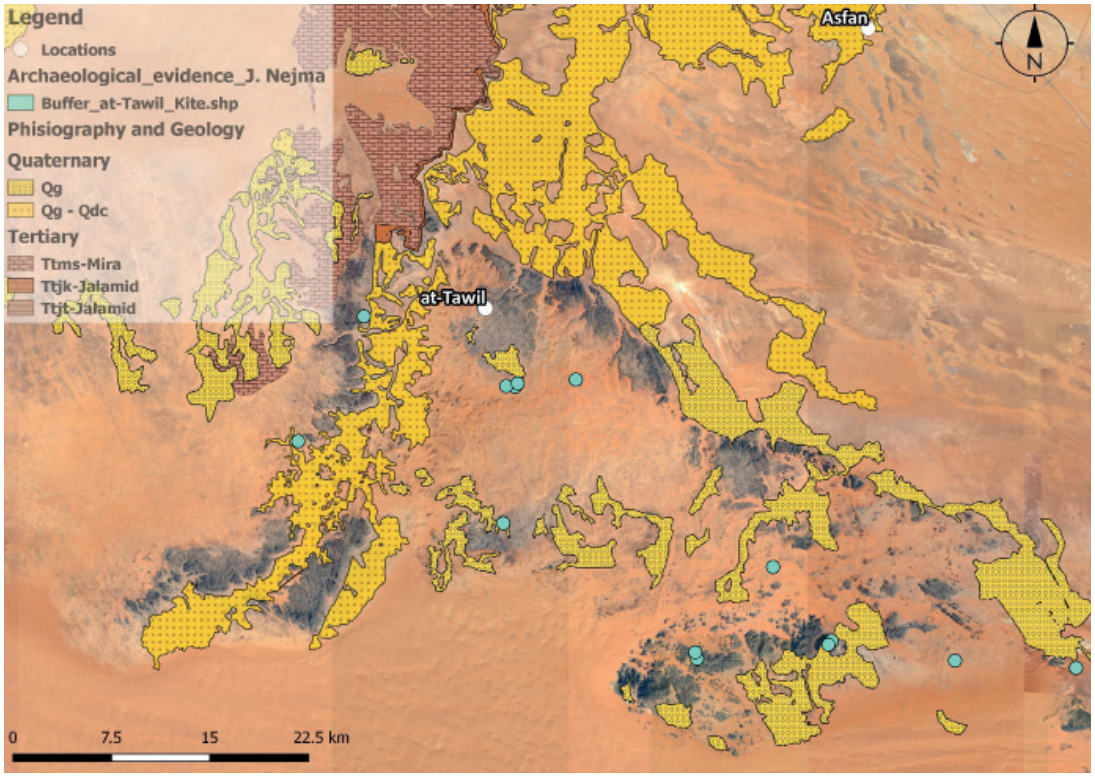


Fig. 23a. Relationship between the Kites and the geological formations presenting aṭ-Ṭawîl flint (Image created with QGIS software)

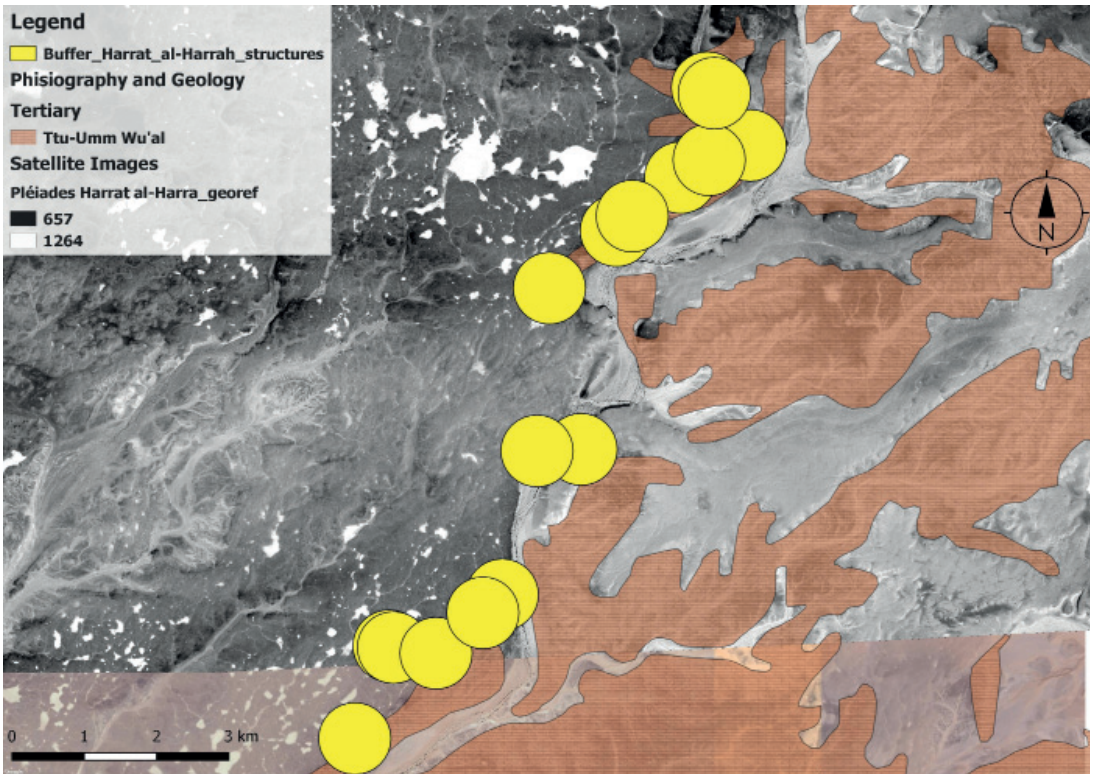


Fig. 23b. Relationship between Kites - Meander walls and the geological formations presenting flint on Ḥarrat al-Ḥarraḥ (Image created with QGIS software)

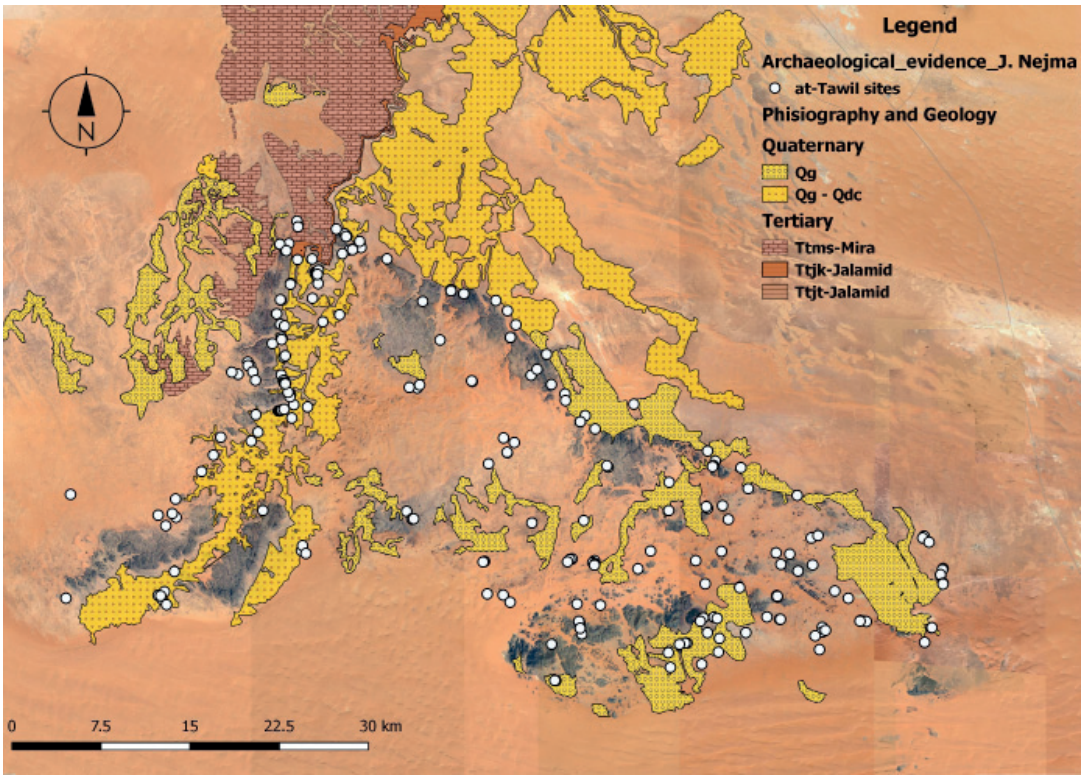


Fig. 24. Anthropic structures placed on or near formations containing flint in the aṭ-Ṭawîl area (Image created with QGIS software)

The result of this query highlights the possibility that the location of the kites, in the investigated areas, did not depend solely on the migratory paths of the animals to be hunted but also on a close relationship with the outcrop areas of the raw material for the production of the stone tools used.

In conclusion, to corroborate this type of analysis it is useful to cite the work of K. Ibrahim & A. Hall on the autogenic zeolites [19] of the volcano-clastic formation of Aritayn, in the north-east of Jordan. This study focused on the sampling of 7 locations: Tell Rimah, Jabal Aritayn (north), Jabal Aritayn (south), Jabal Ashqaf, Jabal Hannoun, Tell Muftyyah, and Jabal Tarboush. These have resulted in the presence of a quantity of crystals and lithic clasts inside the tuff. The lithic clasts present are divided into three lithologies:

1. Vesicular, brown to dark brown, olivine-porphyritic microcrystalline basalt and sometimes porphyric-pyroxene-olivine basalt.
2. Sedimentary inclusions, including sandstone, limestone, quartzite, shale, flint and phosphorite.
3. Ultramafic xenoliths, including spinel-peridotite, spinel-pyroxenite and garnet-pyroxenite.[20]

Lithology at point 2) includes flint and comparing this data with the distribution areas of the kites present in Jordan, it can be seen that the distribution area of the Jordanian kites and the collection areas of the zeolite samples match (**Fig. 25**).

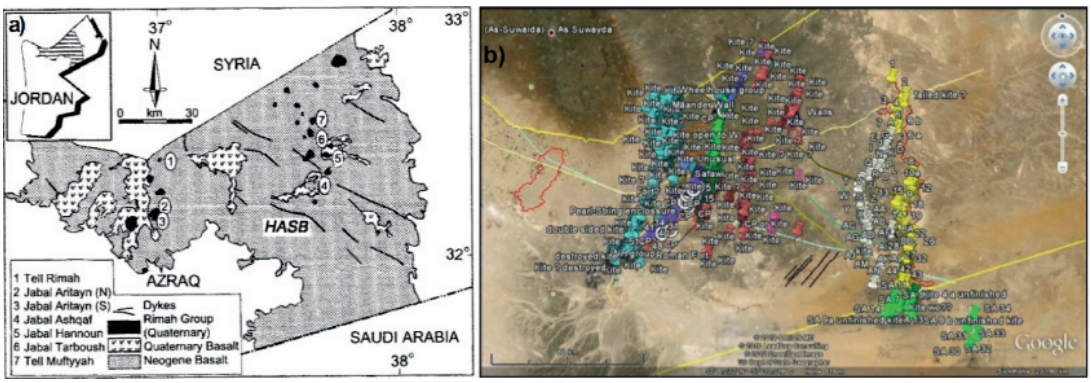


Fig. 25. a) zeolite collection areas (Ibrahim et alii 1996: p. 515); b) Distribution of Jordanian kites (Kempe *et alii* 2012: p. 60)

19. Zeolites are special materials. They form a fascinating class of microporous minerals. They are widely used in ion exchange applications, have unique properties such as sorbents and molecular sieves, and play a dominant role in heterogeneous catalysis. (http://www.chimdocet.it/solido/file11a.htm).

20. Ibrahim & Hall 1996: 514-516.

Relationship between the anthropic structures of the Ḥarrat al-Ḥarraḥ and the hydrographic network

Thanks to the acquisition of a SENTINEL image for the detailed study from Remote Sensing, an integrated study between the anthropic evidence and the surrounding hydrographic network is proposed only for the Ḥarrat al-Ḥarraḥ.

The sample image (11x16 km) of the Ḥarrat al-Ḥarraḥ acquired by the SENTINEL satellite made it possible to identify the dense hydrographic network that covers the area in question. The query linked to the relationship between the hydrographic network and the anthropic structures present on the Ḥarrat al-Ḥarraḥ shows a close interconnection between these two categories (**Fig. 26**). 89% (374 out of 419) of the identified structures are at a distance of no more than 500 meters from the ancient waterways. The waterways were classified following the Horton method modified by Strahler (1958).[21]

In summary, the following relationships emerged:

Structures	Waterways order
197	1
175	2
111	3
52	4

Table 1. Relationship with structures and waterways orders

This clearly indicates the need for nomadic or semi-nomadic people to stop and get supplies in areas featuring watercourses with adequate water supply.

21. Hierarchical quantitative classification of the hydrographic network which envisages assigning a value of 1 to each branch of the hydrographic network, starting from the sources; two branches with index 1 converge in a new branch which will assume value 2; in the same way, going downstream, each confluence between two branches of the same order originates a new branch downstream with an index that increases by 1, in the case of confluence of two branches of different order, the branch downstream of the confluence maintains the index of the highest value branch (https://elearning.unipd.it/scuolaamv/pluginfile.php/17162/mod_folder/content/0/Es01_Identificazione_bacino_e_reticolo.pdf?forcedownload=1).

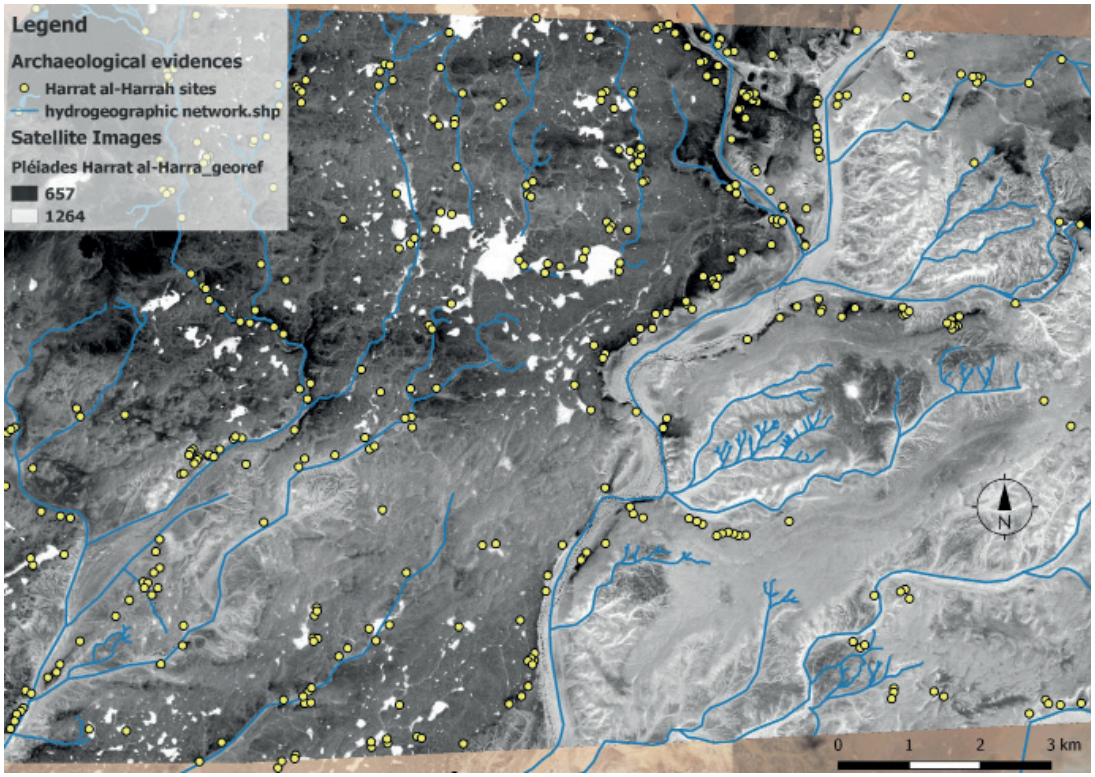


Fig. 26. Relationship between hydrographic network and anthropic structures (Image created with QGIS software)

Relationship between the Compounds and the Kites of Ḥarrat al-Ḥarraḥ and aṭ-Ṭawîl

Analyzing one by one the two types of evidence taken into consideration, we observe that on the aṭ-Ṭawîl there is only one Compound out of the 140 identified consisting of 8 or more single aggregate units, which would demonstrate that settlements in small groups were much more numerous in the area; while the recognized kites are 14.

On the Ḥarrat al-Ḥarraḥ 156 Compounds have been identified, of which 18 are made up of 8 or more single aggregated units. Kites and Meander walls are present only along the major watercourse called Wâdî al-U'ayli (a toponym featured on the Russian topographic map H-37-9 (**Fig. 9**). Since both were used for hunting, the presence of 11 Meander walls and 5 Kites could indicate that the Wâdî al-U'ayli must have been a central hub in the migratory path of the animals (**Fig. 27**).

The query shows that the compounds of aṭ-Ṭawîl located within a Buffer of 500 m from the kites are 6 out of 140, while on the Ḥarrat al-Ḥarraḥ the anthropic compounds placed inside a Buffer of 500 m from the Kites and the Meander walls are 24 out of 157. Of these 24 compounds,

5 show a number of cells consisting of 8 or more units, of which 3 are located near the Meander walls while Compounds 38 and 40, consisting of 10 and 14 cells respectively, are both near the Kite 2 (30°44'17.34"N 38°45'42.28"E).

The query shows that in the two areas the anthropic structures and more specifically the compounds are not directly connected to the kites but are probably conditioned by the strategic position of the area (**Fig. 28a and 28b**).

The other anthropogenic structures used by hunter-gatherers have the same location criteria. In fact, the compounds and single structures are found in the vicinity of water courses, both on Ḥarrat al-Ḥarraḥ and on aṭ-Ṭawîl. The compounds of aṭ-Ṭawîl have an average of 2.9 units which is lower than those of the considered Ḥarrat area, which has an average of 4.1 units. The tombs of aṭ-Ṭawîl and Ḥarrat al-Ḥarraḥ belong to the typology of turret tombs with a long wall (**Fig. 14 and 20**). On the basis of the classification of the kites of the Ḥarrat Khaybar [22], it was possible to recognize the types of kites on the aṭ-Ṭawîl while in the investigated al-Ḥarraḥ there is only one type of the kites that is the star one.[23] Although we are in two different environments (Ḥarrat is a plateau formed by basaltic lava, while aṭ-Ṭawîl is a rock formation) we find the same structures.

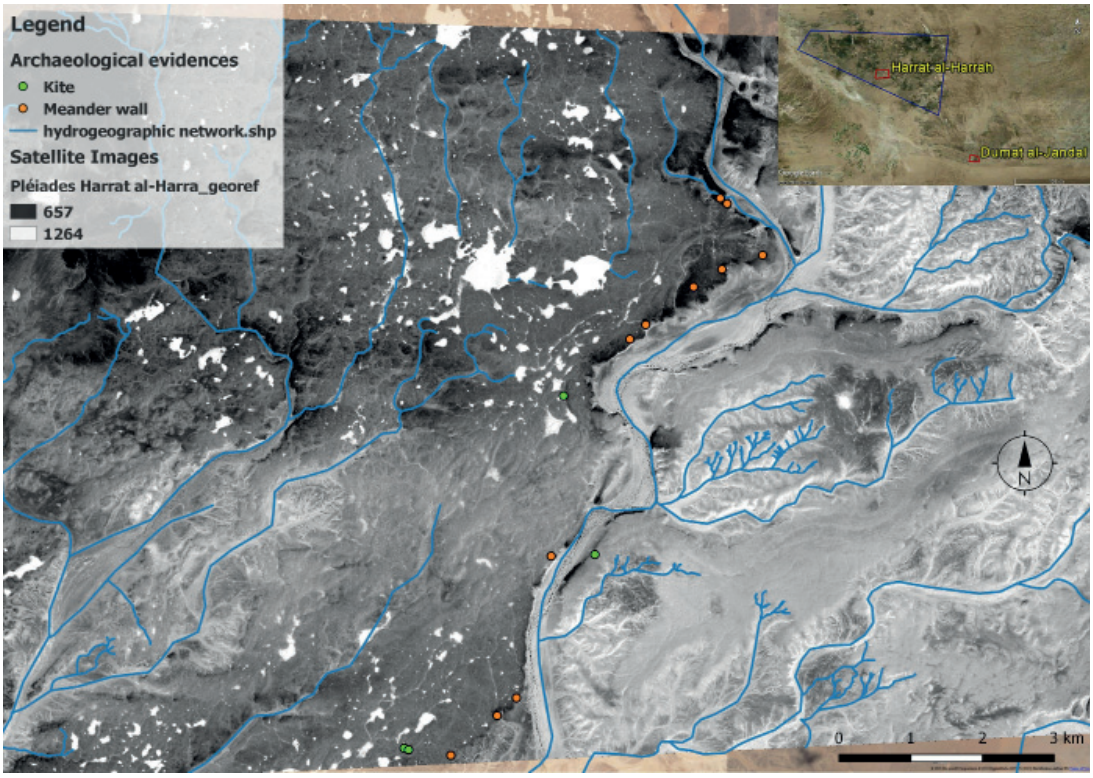


Fig. 27. Meander walls and Kites distributed near the wâdî (Image created with QGIS software)

22. Kennedy *et al.* 2015: p.186, fig. 15.
23. Betts & Helms 1986: 68.

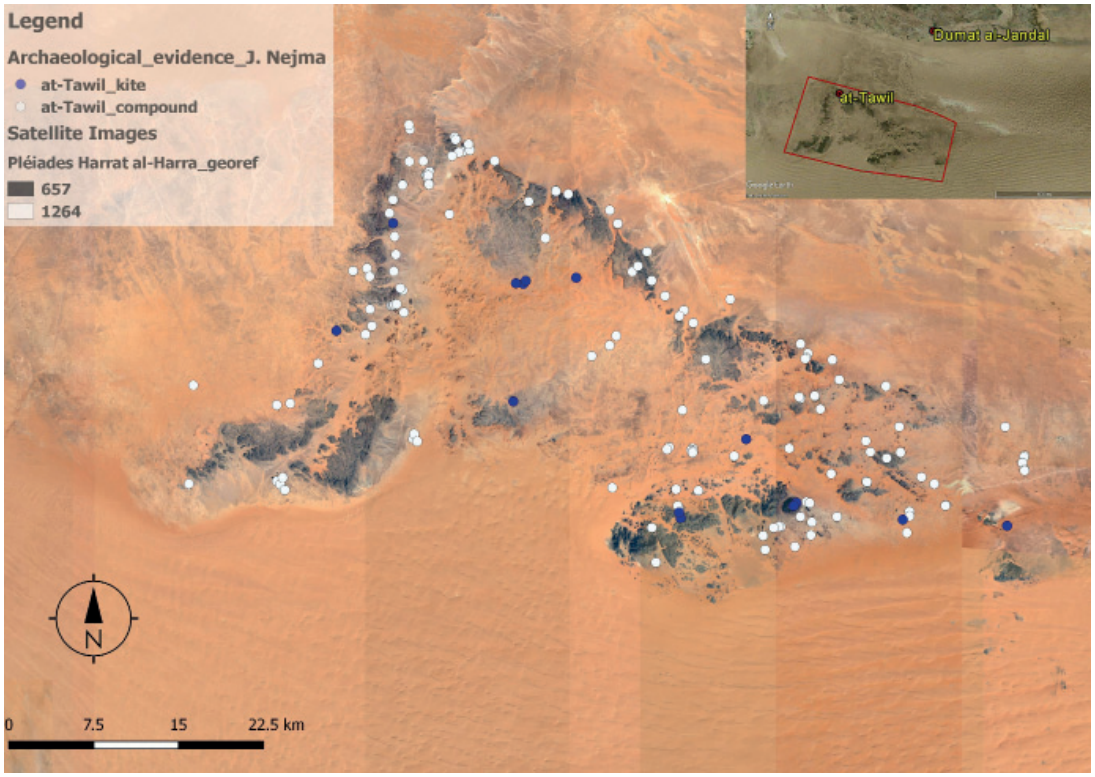


Fig. 28a. Distribution of the compounds in the 'aṭ-Ṭawîl (Image created with QGIS software)

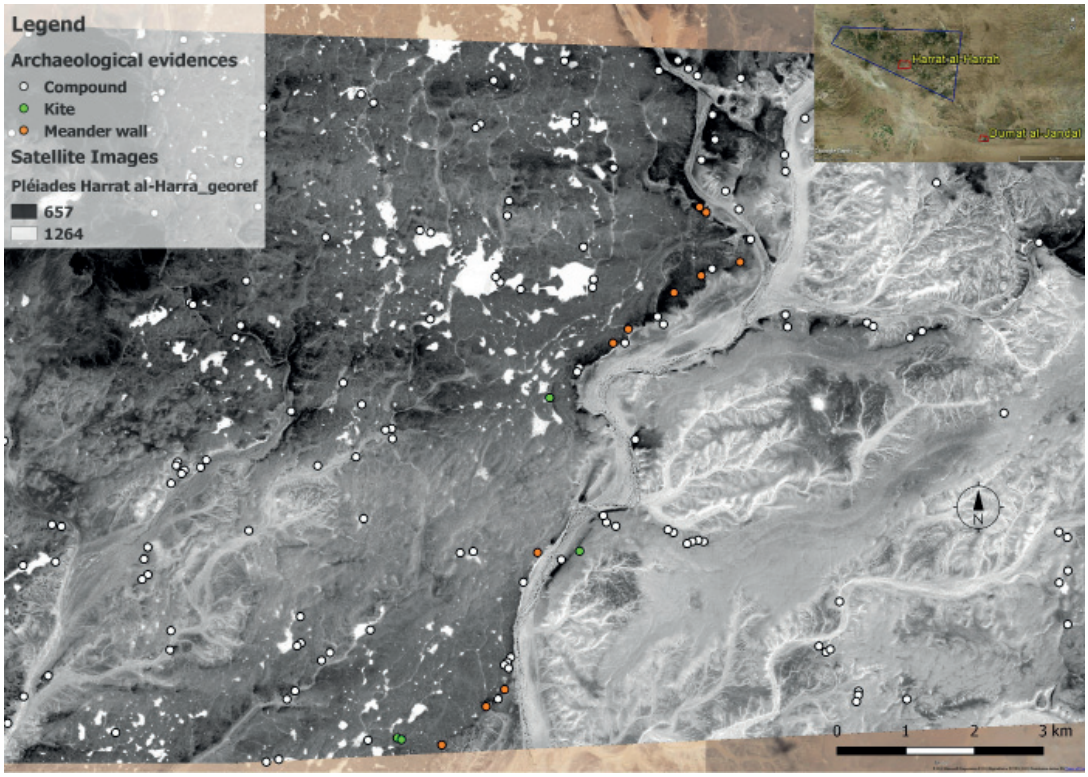


Fig. 28b. Distribution of the compounds in the Ḥarrat al-Ḥarraḥ (Image created with QGIS software)

Below are the minimum and maximum shares of the various anthropic evidences divided by category:

	at-Tawil		Ḥarrat al-Ḥarraḥ	
	Min altitude (m)	Max altitude (m)	Min altitude (m)	Max altitude (m)
Compound	675	999	639	708
Kite	869	1079	659	678
Meander wall	-	-	663	684
Single structure	680	914	645	712
Tomb	688	960	642	705

Table 2. Altimetry of recording structures

The difference between the two areas under investigation is the absence of Meander walls on the aṭ-Ṭawîl. Most of the kites of aṭ-Ṭawîl and Ḥarrat al-Ḥarraḥ were built on the territory following the same pattern; guiding walls possibly supporting hunting that begin at the edge of the watercourse and go up along the rock formation where the kite head is positioned (**Fig. 29**).

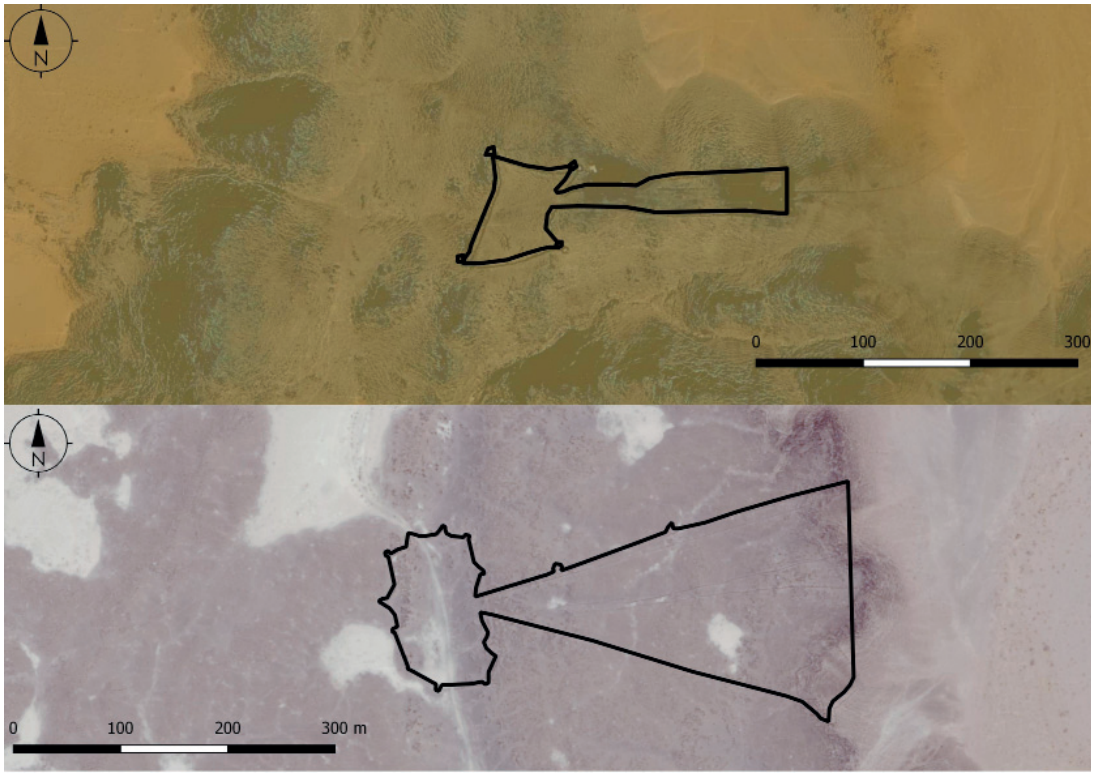


Fig. 29. Example of aṭ-Ṭawîl and Ḥarrat al-Ḥarraḥ kites (Image created with QGIS software)

The chronological issue

The purpose of these structures, still under debate, is linked to adaptation strategies in an increasingly arid environment and therefore rich in wide open spaces: compounds (or agglomerated houses), kites, tombs, "U-shaped" and "meander" structures. This evidence underlines how during the Neolithic the now largely desert North Arabia was rich in vegetation.

The compounds, whose function is still to be defined, probably are seasonal structures linked to hunting (those near the kites) or used to store or transform grains or, in general, products resulting from the collection of wild vegetable elements (those far from the kites).[24] The structure of the kites (**Fig. 30**) and their positioning on the territory seem to indicate, as evidenced by the graffiti found, their use as traps in hunting; the question about the duration of their employment is still an open matter.[25]

The kites are structures characterized by an initial path (guiding walls or antennae) used to channel the animals, at the end of which there was an enclosure (head), structured in various cells where the animals were killed. The direction of the path could be significant as it has been interpreted as an indicator of the direction from which the migratory herds came, although their positioning and orientation may have been influenced by the surrounding landscape.[26]

The variety in the shape of the kites has led to a division by types, some of which are dated earlier than others, although an accurate date is unknown.

A possible dating regarding the anthropogenic evidence of Ḥarrat al-Ḥarraḥ and aṭ-Ṭawîl/Jabal Nejma is based on the classification of kites made by S. Helms and A. Betts. According to this classification, the kites of the sampled Ḥarrat al-Ḥarraḥ would fall into the type D dated between 7000 and 3500 BC, while in aṭ-Ṭawîl/Jabal Nejma we would have both type D and type E kites dated between 4500 and 3000 BC.

Holzen dealt with the study related to the function and dating of the kites found in the Negev, highlighting how these, fall into type E. To this end, two radiometric dating methods were applied (carbon radiocarbon and IRSL [27] of associated sediments), together with the examination and analysis of the material culture associated with kites or overhanging buildings, burials (mounds) and housing units. The kites, according to these two dating methods, seem to have had an active function from the end of the 4th and throughout the 3rd millennium BC.[28]

24. Loreto 2017: 67.
25. Loreto 2017: 65.
26. Kennedy *et al.* 2015: 185.
27. Infrared stimulated Luminescence.
28. Holzer *et al.* 2010.

The possibility that the anthropic structures of Ḥarrat al-Ḥarraḥ are older than those of aṭ-Ṭawîl/Jabal Nejma is given by the presence of Meander walls (functional structures for hunting). Kempe states that kites are part of a newer and radically different hunting technique to meander walls as some guiding walls cut or embed the walls in them.[29]

In contrast to Kempe's theory, Barge argues that the Meander walls should be associated with the alignments of the kites of the Ḥarrat ash-Sham. Placed between one kite and another, the Meander walls seem to act as a link, thus creating a continuity along the alignment.[30]

Their function seems most likely related to that of kites, as demonstrated by the presence of cells in the upper part of some Meander walls, or by the existence of long straight walls very similar to guiding walls.[31]

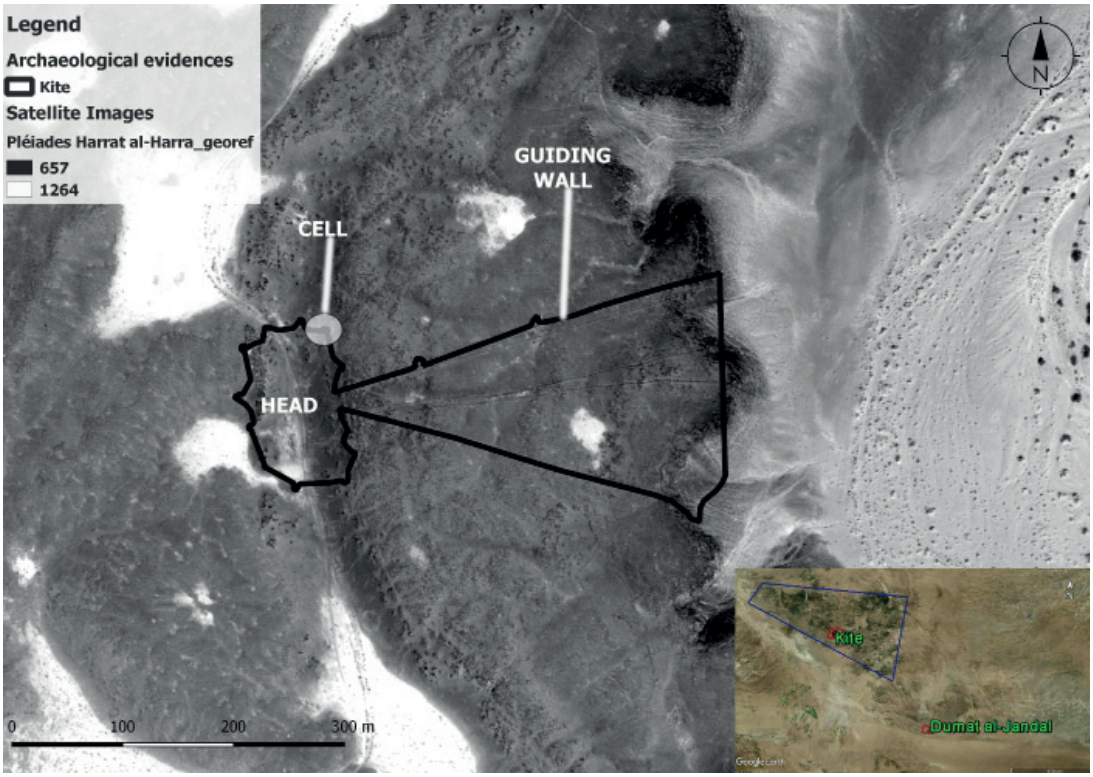


Fig. 30. Kite structure (Image created with QGIS software)

29. Kempe & Al-Malabeh 2010: 206.
30. Barge *et al.* 2015: 152, fig. 8.
31. Barge *et al.* 2015: 148-150, 153, fig. 9.

The Kites from the Ḥarrat al-Ḥarraḥ and at-Tawil in light of the GlobalKite project

Starting from 2013, a project focused on the study of "Desert Kites" was launched, which combines surveys both through high-resolution satellite images and in the field.[32] This project called GLOBALKITES[33] has addressed the topic with different approaches including archeology and geomantics, geo-archeology, environmental studies, zooarchaeology and animal ethology with the aim of answering questions that have not yet found an exhaustive answer such as those relating to dating, function and on the reasons why such a wide distribution has occurred over time. The work produced by the GLOBALKITES project and still in progress is present in the 2015 text by Barge et alii of 2015 in which data from Jordan's Ḥarrat ash-Shâm are compared with those from Armenia and Kazakhstan (Ustyurt). The Ḥarrat ash-Shâm (**Fig. 31**) with over 2000 registered structures, contains almost half of the kites listed so far (total in the global distribution area: over 5,000). Only in the part of the Jordanian Ḥarrat ash- Shâm there are more than 1000 kites.

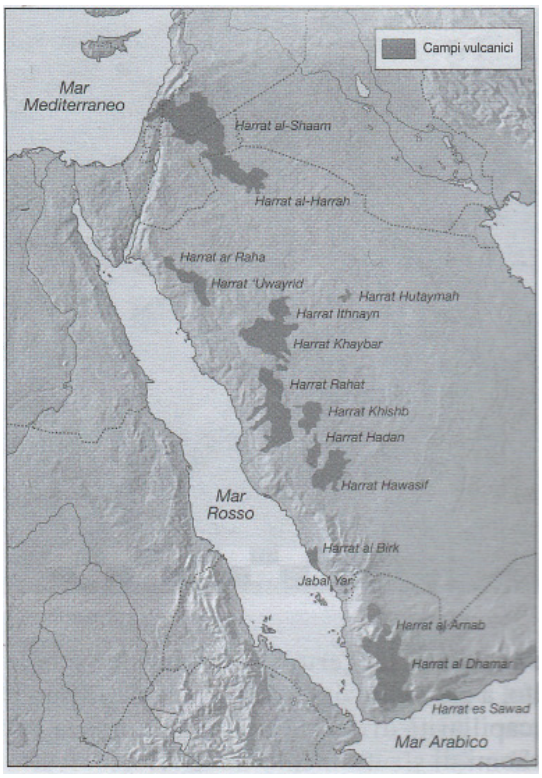


Fig. 31. Harrat of the Arabian Peninsula (Loreto 2017: 64, map 5)

32. see www.globalkites.fr

33. Barge *et al.* 2013.

The following diagram shows the great variety both in the type and in the orientation of the kites on the aṭ-Tawîl:

Name	Type	Orientation
Kite 1	Star	SE
Kite 2	Berbed Arrow	N
Kite 3	Star	-
Kite 4	Star	N
Kite 5	Rounded Arrow (reverse)	NO
Kite 6	Star	NO
Kite 7[1]	-	-
Kite 8[2]	-	-
Kite 9	Rectilinear Arrow	NE
Kite 10	Amorphous	-
Kite 11	Rectilinear Arrow	E
Kite 12	Type E	N
Kite 13	Type E	SO
Kite 14	Type E	NO

Table 3. aṭ-Tawîl. Kite's types and orientation

Footnotes for table 3

1. The poor quality of the satellite images does not allow to clearly identify the kite.
2. No comparisons with other kites were found.

For kites from 1 to 11 (excluding kites 7 and 8) the type was obtained from the comparison with those identified on the Ḥarrat Khaybar, however, the kites 12, 13, 14 fall within the classification of kites made by S. Helms and A. Betts in 1987 with the name "Type E"[34] found so far only in the Sinai, in the Negev Desert and in Jawa (Jordan). The identification of "Type E" kites on the aṭ-Ṭawîl does nothing but underline the high archaeological interest of the area. From the observation of satellite images, the Kites 3, 8, 10 seem to have a closed shape as there are no visible signs of guiding walls. The number of guiding walls ranges from 0 to 6 with an average of 1.6 per kite, most likely some of them show more generations but they are not visible from the satellite images. We are in an area where linear distributions, like those in the Harrat ash-Shaam, do not seem to exist.

The kites of the Ḥarrat al-Ḥarraḥ sample fall within the "star" type, they are placed along a band of about 15 km (also considering the kites outside the sample) that runs along the Wâdî al-Uayli, with a north -east / south-west orientation matching the data from the Ḥarrat ash-Shâm (Jordan). They extend along a distance between 15 and 60 km and about 56% are located in the vicinity of the wydiân.[35] The orientation on the Ḥarrat ash-Shâm (Jordan) of almost all the kites (about 98%) is the same, ie east / south-east.

34. Helms & Betts 1987: 52-54.
35. Barge *et al.* 2015: 146, fig. 2.

According to Kempe and Al-Malabeh (2012) the remaining 2% have a different orientation and some are connected via guiding walls to kites open to the east. These so called "auxiliary kites",[36] are characterized by a head whose average surface is 0.15 ha (hectares) while the average cells are 2.9. Echallier-Braemer (1995) hypothesize that these were anti-escape devices, structures that were used to prevent animals from escaping in the opposite direction to the opening of the main kite.[37]

Name	Type	Orientation
Kite 1	Star	E
Kite 2	Star	SE
Kite 3	Star	SE
Kite 4	Star	SE
Kite 5	Star	SE

Table 4. Ḥarrat al-Ḥarraḥ. Kite's types and orientation

The kites of the Ḥarrat al-Ḥarraḥ sample have an average of 5.8 guiding walls against an average of 2 on the Ḥarrat ash-Shâm. 44% of the kites of the Ḥarrat ash-Sham (Jordan) have more than 2 guiding walls but it is related to the overlap of several generations, as in the case of Kite 3 and Kite 5 on the Ḥarrat al-Ḥarraḥ (**Fig. 32**). The Jordanian kites were subjected to multiple renovations due to the reorganization of some of their parts or the construction of new ones in the same spot. Furthermore, in their vicinity there are many cases of overlapping or construction of other structures, such as those called "jellyfish" or "wheel houses",[38] the encampments, the pastoral enclosures, the tombs, etc. These remakes and overlays are numerous (45%) compared to those that reveal only one stage. The proportion reaches 64% including the tangle of guiding walls.[39]

In Armenia, the Aragats kites form a block of 179 kites over an area of just ca. 100 km^2. They are positioned along the edges of the lava flows: the entrance is generally built on the interruption of the slope that marks the front of the flow. The guiding walls face uphill while the head is placed downhill, the shape is similar that of star kites.[40]

The vast Ustyurt Plateau, located between the Caspian Sea and the Aral Sea, is covered with 508 kites. Four types of kites can be distinguished. " (1) The first type can be described as the 'regular shape', as all the attributes of a kite are present: two convergent antennae ending in an enclosure surrounded by several cells. (2) The second type group shapes are identical to the ones with regular forms, but the chink (the overhang that marks the edge of the plateau) is incorporated into the enclosure. It will be referred hereinafter to as 'chink enclosure' type. (3) The third type can be called the 'headland kite'.

36. Kempe & Al-Malabeh 2012: 58, fig. 1.
37. Barge *et al.* 2015: 150.
38. Kempe & Al-Malabeh 2010: 208, fig. 8.
39. Barge *et al.* 2015: 151.
40. Barge *et al.* 2015: 153.

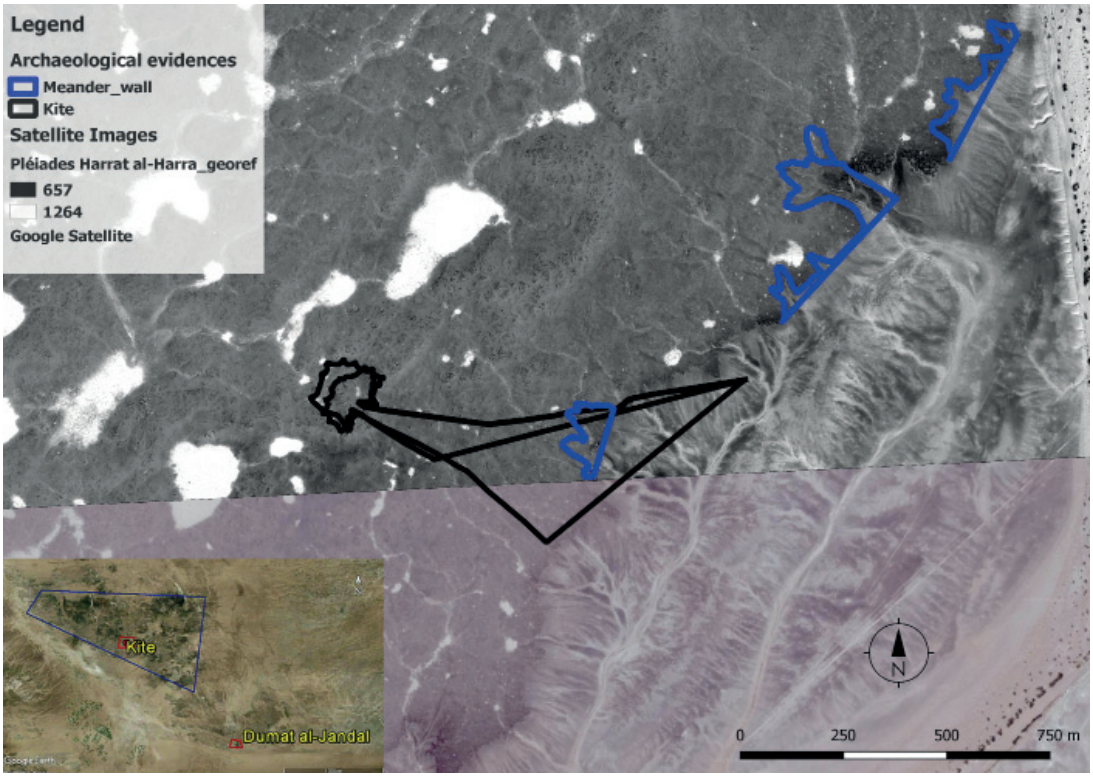


Fig. 32. Overlap of two Kites of Ḥarrat al-Ḥarrah (Image created with QGIS software)

This is a variant of the chink enclosure type: it takes advantage of the numerous headlands created by the chink's irregular outline. Only the entrance of the kite is built at the narrowest part of the headland. The two previous types display opportunistic shapes: as the chink is often very steep and sometimes even vertical, there was no need to build a wall. The Chink is then cleverly used by minimizing the energy needed to build the kite. (4) The fourth type may also feature all the attributes of a kite, but the shape, only encountered on the Ustyurt plateau, is very peculiar. A triangular sub-enclosure lies to each side of the entrance, facing the opposite direction from the kite entrance, with a cell at each tip. This type will be called 'double arrow' kite".[41]

The element in common to all these kites is the funnel-shaped entrance, delimited on both sides by a cell with a proximal tip. The cells are circular and closed and their surface plane is lower than that of the enclosure. Field work has allowed us to note cases of overlapping kites (which was not apparent from satellite images) belonging to different generations.[42]

Since all kites have three elements in common that distinguish them, namely the surface of the head (or enclosure), the number of cells and the length of the guiding walls it is possible to make comparisons between these areas.

41. Barge *et al.* 2015: 4-5.
42. Barge *et al.* 2015: 154.

Table	Kite heads surface (ha)	Number of cells	Min lenght of Guiding walls (m)	Max length of Guiding walls (m)
Ḥarrat ash-Sham (Jordan)	0,5-1,5	3-10	300	1000
Ustyurt Chink	0,5-3	2-3	50	200
Armenia	1-2,5	2-4	100	500
aṭ-Ṭawîl	0,3-1,8	1-8	41	387
Ḥarrat al-Ḥarraḥ	0,8-1,9	9-14	106	936

Table 5. Comparisons between kites from Near eastern contexts

This leads to the recognition of the great variety in the size of the kites head; going into more detail we can say that the Armenian ones are larger than those of Jordan, of aṭ-Ṭawîl and Ḥarrat al-Ḥarraḥ since 75% is greater than 1.5 ha while in Jordan 75% is less than 1.5 ha; while for the sampled aṭ-Ṭawîl and Ḥarrat al-Ḥarraḥ the percentages are respectively 85% and 60% below 1.5 ha. Along the Chink, the presence of many rocky spurs makes comparisons difficult; these kites that skillfully make use of the edge of the rocky spur have revealed an entrance built into its most narrow point. The surface defined by the spur behind the entrance is variable due to the different natural configurations, which sometimes outline huge or small enclosures.

The table shows that the number of cells is lower in Armenia and on Ustyurt Chink than in the other three areas. While the areas that have the greatest interval between the cells are the Harrat ash-Sham and the aṭ-Ṭawîl, where the kites have a greater typological variety. Regarding the length of the guiding walls, the difference between the minimum and the maximum length is wider on the Jordanian Ḥarrat ash Sham. Here it is not unusual to have more than 2 guiding walls which represent the standard number unlike the area along the Chink where many kites only have one, or that of aṭ-Ṭawîl where some seem not to have guiding walls.[43]

Prospects for research applications and developments in other Arabian contexts

Ḥarrat Khaybâr

The Ḥarrat Khaybar has a complex volcanic stratigraphy and is made up of the most important felsic volcanoes of the Arabian Peninsula.

43. Barge *et al.* 2015: 157.

Together with the Ḥarrat Ithnayn and Ḥarrat Kura (**Fig. 33**) they constitute the largest contiguous area of Cenozoic basalt in Saudi Arabia. This area is of great interest due to the numerous anthropic structures identified: kite, wheel, pendant, keyhole, gate and cairn.[44]

The kites identified in the Ḥarrat Khaybar are mainly located near the oases of Khaybar and Al-Ha'it. Others are present along the south-eastern and south-western edges of the lava field while they are not present in the central area of the formation.[45] The presence of stone structures within the Ḥarrat Khaybâr indicates some human activity but the lack of hunting opportunities in this area is underlined by the lack of kites. The kites are rarely isolated, and even in the most remote cases they are never more than 1km away from the closest counterpart. Noteworthy are the gates that are not attested anywhere else, including the Ḥarrat ash-Shâm, which has been the subject of extensive research in almost every season of the Aerial Archeology project in Jordan since 1998. The gates are also found in other areas of Saudi Arabia, but the first (and so far largest) concentration is in Ḥarrat Khaybâr.[46]

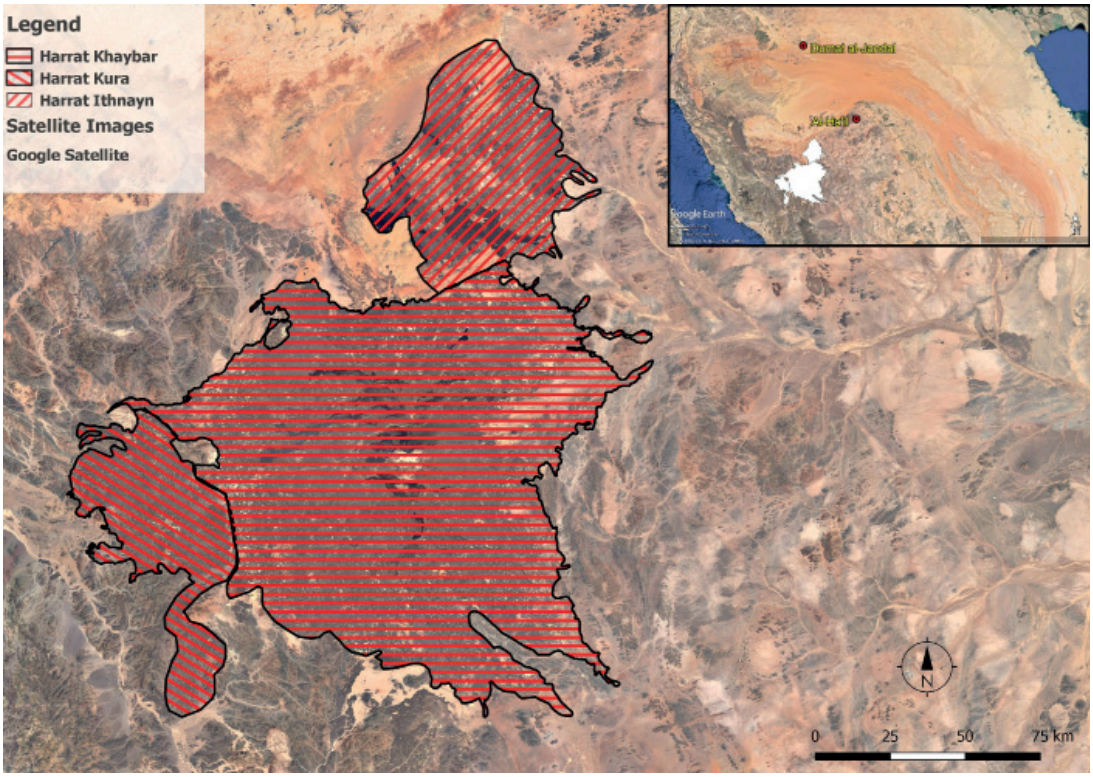


Fig. 33. Harrat Khaybâr (Image created with QGIS software)

44. Kennedy *et al.* 2015: 194; Camp *et al.* 1991.
45. Kennedy *et al.* 2015: 192, fig. 10, left.
46. Kennedy *et al.* 2015: 192; Mouft & Németh 2014.

Ha'il

The province of Ha'il has been the subject of study for rock art mainly with the sites of Shuwaymis [47] and Jubbah.[48] The rock art found dates back to the wet phases of the Early Holocene.

From the strictly methodological aspect, broad research perspectives immediately emerge, such as the case briefly introduced below (**Fig. 34**).

The area considered is 200x200 km around the city of Hail. The project is still in its embryonic phase and the currently mapped area is 100x200 km (**Fig. 35**) in which the same anthropic structures found on the Harrat al-Ḥarraḥ and on the aṭ-Ṭawîl/Jabal Nejma have already been identified (**Fig. 36**) although there are two substantial differences:

- A series of tombs placed along the edges and / or inside and outside a rectangular enclosure (mustatil) (**Fig. 37**);
- The tombs cover most of the considered sample.

Fig. 34. al-Ha'il area (Image created with QGIS software)

47. Jennings *et al.* 2014.
48. Jennings *et al.* 2012.

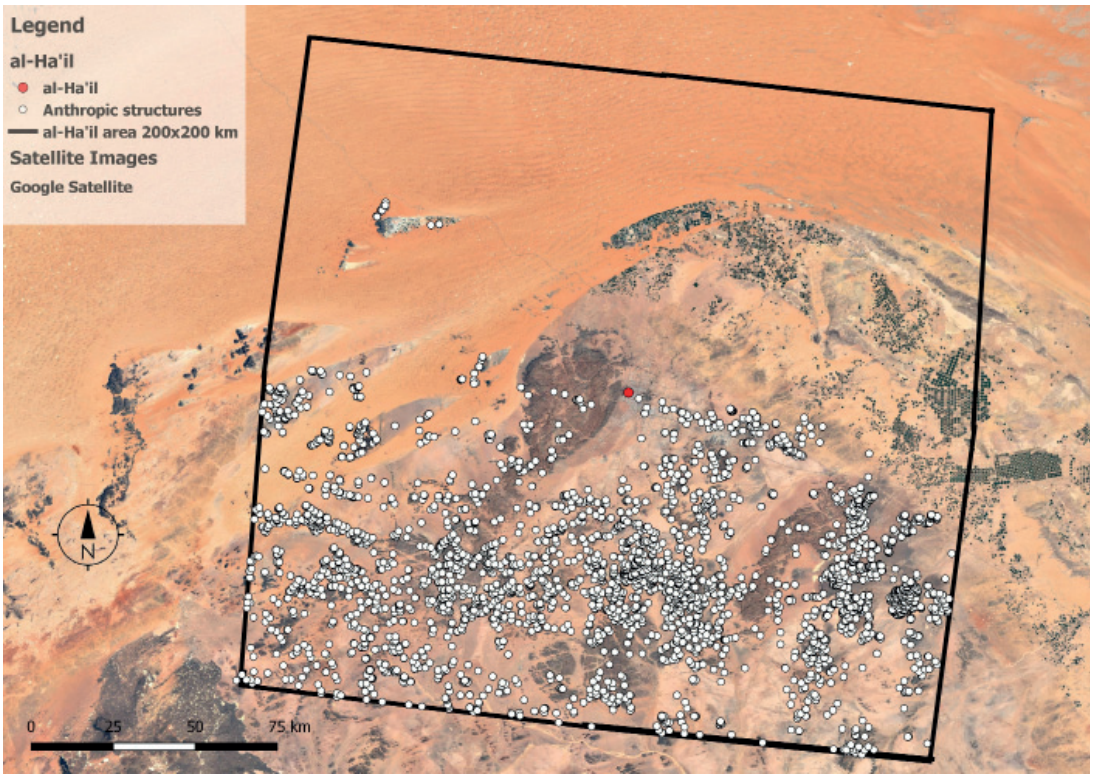


Fig. 35. al-Ha'il 200x200 km (Image created with QGIS software)

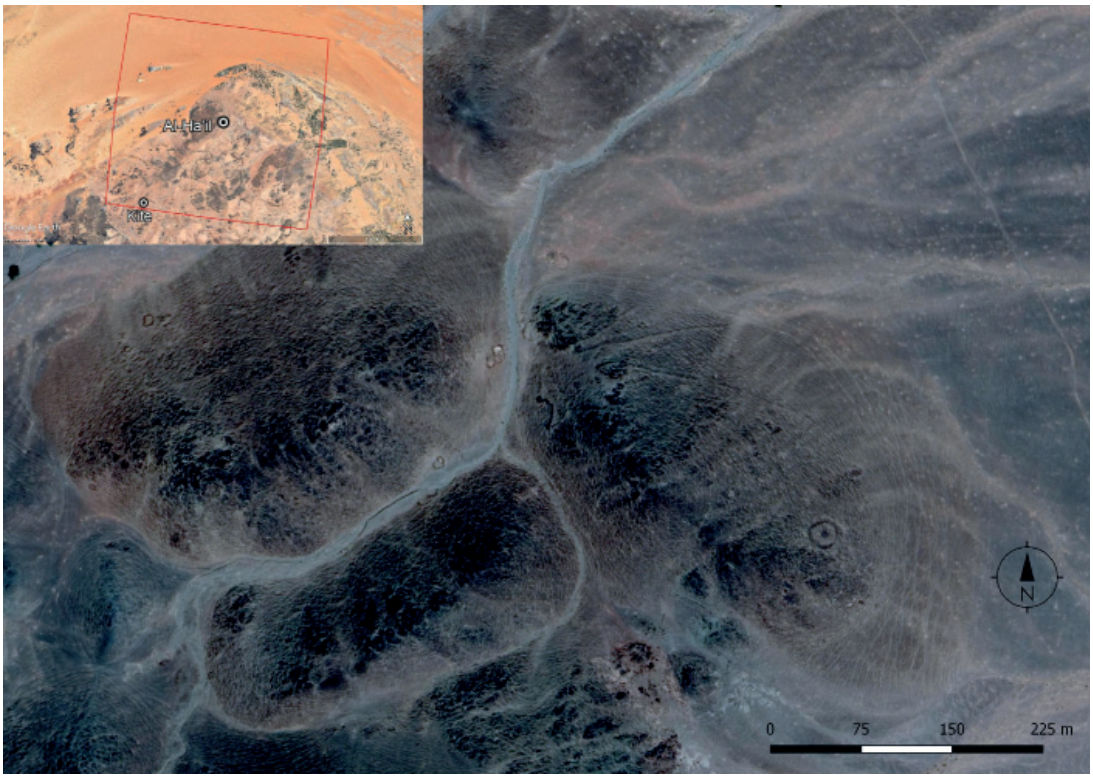


Fig. 36. Anthropic structures present in al-Ha'il (Image created with QGIS software)

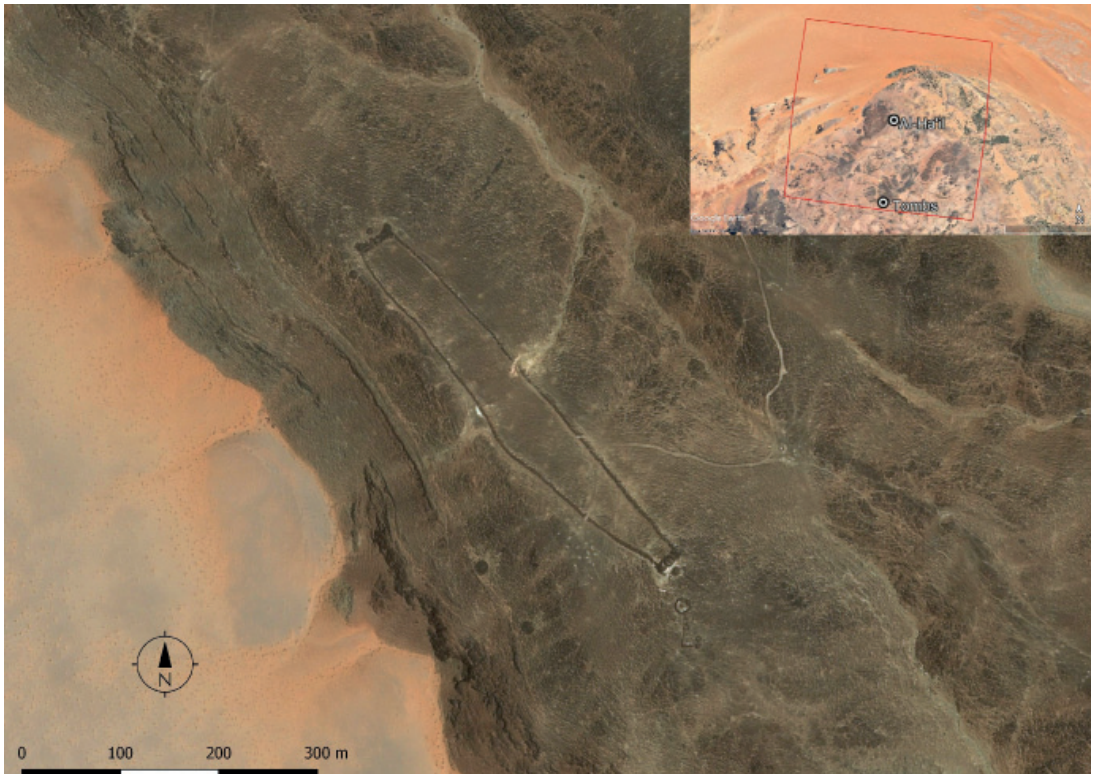


Fig. 37. Tombs placed along the edges and / or inside and outside of a fence mustatil (Image created with QGIS software)

2015 Excavation in Trench 1, Sector A

Romolo Loreto [1]
Vincenzo Regine [2]
Thamer al-Malki [3]
Dharhan al-Qahtani [4]

The enlargement of Trench 1 to the north/north-west

Among the excavation activities carried out by the Italian team in 2015, from 17th October to 12th November, in Sector A, Trench 1 was enlarged towards north/north-west (Quadrants N5- N4) in order to continue the investigation of the eastern residential area that extends at the foot of the castle of Mârid (**Figs. 1 and 2**).

Fig. 1. Sector A, the extension of Trench 1 in a north/north-west direction, view from south

1. University of Naples *L'Orientale*.
2. Indipendent Researcher.
3. Saudi Ministry of Culture.
4. Saudi Ministry of Culture.

Fig. 2. Sector A, general view of the 2015 excavation area, view from west

The considerable extension of the area investigated, as well as the presence of particularly consistent accumulation layers (levels 1, 2, 3a, 3b), led to the excavation of a large surface of 10 x 15 m north/north-west of locus 14. L14 is an Islamic environment excavated in previous campaigns and defined to the north by M34, a wall made of irregular courses with a small entrance surmounted by a tympanum clearly resulting from the re-use of a monolithic block related to a previous building. M34 represents the norzthern limit of the urban sector identified up to season 2014.[5] Also, along the north-west section of Trench 1, one can have a full view of the stratigraphic sequence (levels 1, 2, 3a, 3b) systematically removed: these levels appear to be huge discarded layers derived from the dismantle of previous structures, since materials dated from the 6th cent. BCE up to the most recent Islamic centuries were collected. Starting from level 1, this stratigraphic sequence follows what was observed after the excavations of previous seasons (**Fig. 3**).

The removal of the surface level (level 1) did not require particular efforts, as it is a layer of loose gray earth of a few centimeters with various traces of burns, burnt animal bones (mainly dromedary) [6] stone flakes and mainly coarse ceramics mixture.

5. See Loreto 2014: 91-144, 2016a: 101-146.

6. Monchot 2014: 205: "Camels make up a significant proportion of the Dûmat al-Jandal and al-Yamâma bone assemblages throughout the excavated sequences and the zooarchaeological results clearly show a subsistence economy largely based on this animal. Camel is a purveyor of meat, milk and wool, but it would be simplistic to reduce this species only for the human diet (…) Camel, one of the symbols of the Bedouin life, served as transportation during many trips into the desert from oasis to oasis. The several uses of the camel are thus a dietary element, a beast of burden, a source of raw material for artifact manufacture and a cultural symbol".

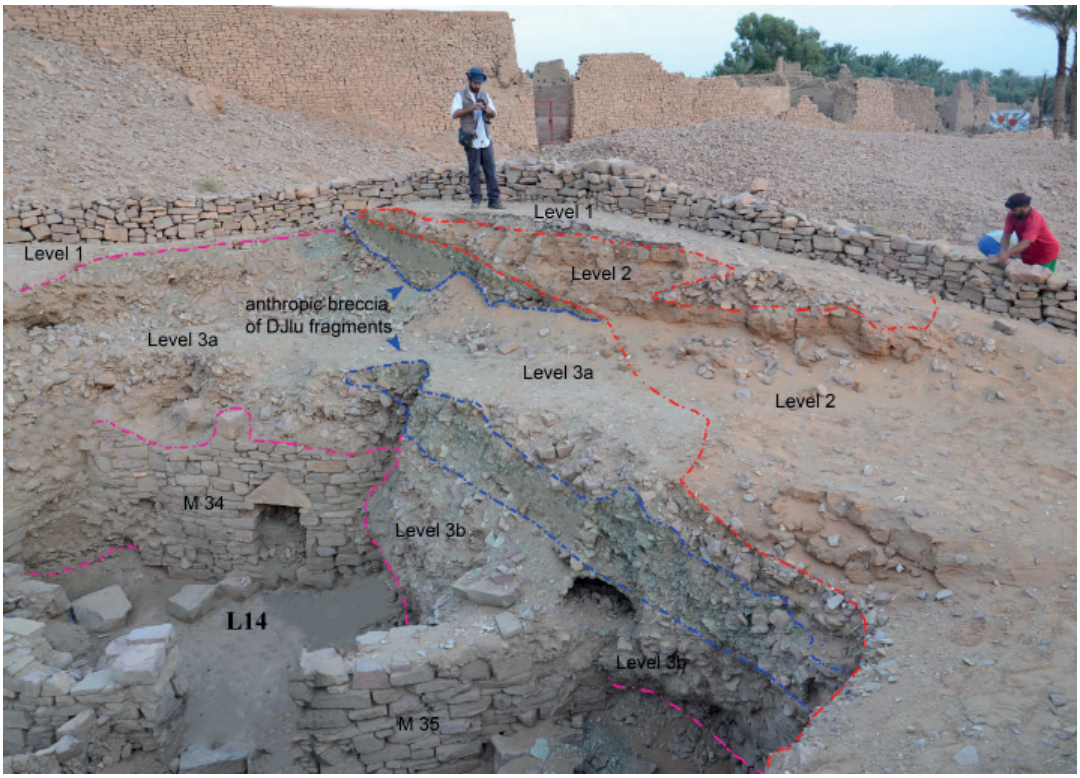


Fig. 3. Sector A, Trench 1, detail of the stratigraphic sequence prior to the excavation, view from south-east

Below level 1, a substantial layer of abandonment of aeolian sand, not completely sterile, of yellow color (level 2) has emerged, accumulated over the centuries due to the effect of the deflation on the entire surface of the area. Among the objects found, there is a head of a terracotta female figurine (DJ.15.AO/03) of whose expressive facial features are clearly visible, a veil on the head and traces of dotted decoration on the neck that can be interpreted as a necklace that refers to a type of production from the late Hellenistic period.[7] This abandoned level settled above level 3a consists mainly of loose stones and sandy deposits, with a small percentage of greenish-colored shale clay breccias and stones.[8]

Level 3a, as also seen in previous years, represents part of a massive level of waste (together with level 3b) and, therefore, is archaeologically more interesting having returned a large number of ceramic fragments (Islamic and pre-Islamic), bones, millstones and objects of various types and materials.

7. See Loreto & Polosa in this volume.

8. Specifically, these are anthropogenic breccias whose lithology is formed by finely stratified shale clay, sandstone and thin limestone interbeds pertaining to the lower member of the DJLU (Jawf Formation- Upper and Lower members combined). The greenish color of the breccias is given by the presence of micaceous minerals (chlorite, biotite and illite). Ultimately, this material constitutes a fill deposit, probably the result of the excavation of one of the nearby wells, in secondary position and compacted over time. See Meissner *et al.* 1989: 9-11.

Particularly interesting was the discovery of a dedicatory Taymanitic inscription, engraved on a fragment of a sandstone plate (DJ.15.A.I/1). This find is to be ascribed chronologically starting from the 6th century BCE and bears the indication of a patronymic: {*By*] *Mṣd* {son of} {Nbr} (**Fig. 4**).[9]

Among the various objects found in level 3a there are also fragments of glass containers (DJ.15.A.O/02a-b), polychrome vitreous paste bracelets, a bronze plaque, terracotta zoomorphic figurine (DJ.15.A.O/14) and various fragments of incense burners with traces of engraved decoration (DJ.15.A.O/11; DJ.15.A.O/18; DJ.15.A.O/26).[10]

Another layer of clayey breccias divides level 3a from level 3b (**Fig. 3**). Level 3b continues up to the rocky level of Trench 1, covering every identified structure, and is largely made up of loose stones and gray sandy deposits. Levels 3a and 3b are therefore both made up of materials that are quantitatively very consistent: mostly small and medium-sized stone fragments, but also large and medium sandstone blocks, unfired bricks and plaster fragments from older buildings or, in part, collapsed from the top of the slope on which the castle of Mârid stands, completely obliterating the underlying structures now in a state of abandonment. This evidence therefore suggests the presence of architectural structures from various periods built both above the ancient Nabataean acropolis [11] and at the foot of the talus, such as Building A.

L48

With the removal of levels 3a and 3b, near M34, an accumulation of medium-sized stones joined to compact earth and large well-shaped sandstone slabs (level 29) emerged, probably related to the collapse of M34 (**Fig. 5**). The removal of level 29 led to the discovery of M7 and M95 which, together with M34, respectively constitute the southern, western and northern limits of a locus (L48) (**Figs. 6 and 7**).

With the proceeding of the excavation in L48, a retaining structure (M96) of approx. 1 m in length was brought to light. It rests on M95 along its north-eastern limit, and crosses perpendicularly to M97, the eastern limit of L48 (**Figs. 8 and 9**).

At the center of L48, a 1 x 0.55 m bench is identified: the only clearly definable piece of furniture, with flat blocks and a smooth surface integrated by a large stone visible from its west side (M 99) (**Figs. 10 and 11**). In L48 south-west corner, a small structure (M101) is brought to light, against which a large stone placed vertically rests, to define what could appear as a second functional element of the locus (**Fig. 10**).

9. See the contribution by Michael M. Macdonald in Loreto 2016b: 173-180.
10. See Loreto & Polosa in this volume.
11. See Loreto & Cocozza in this volume.

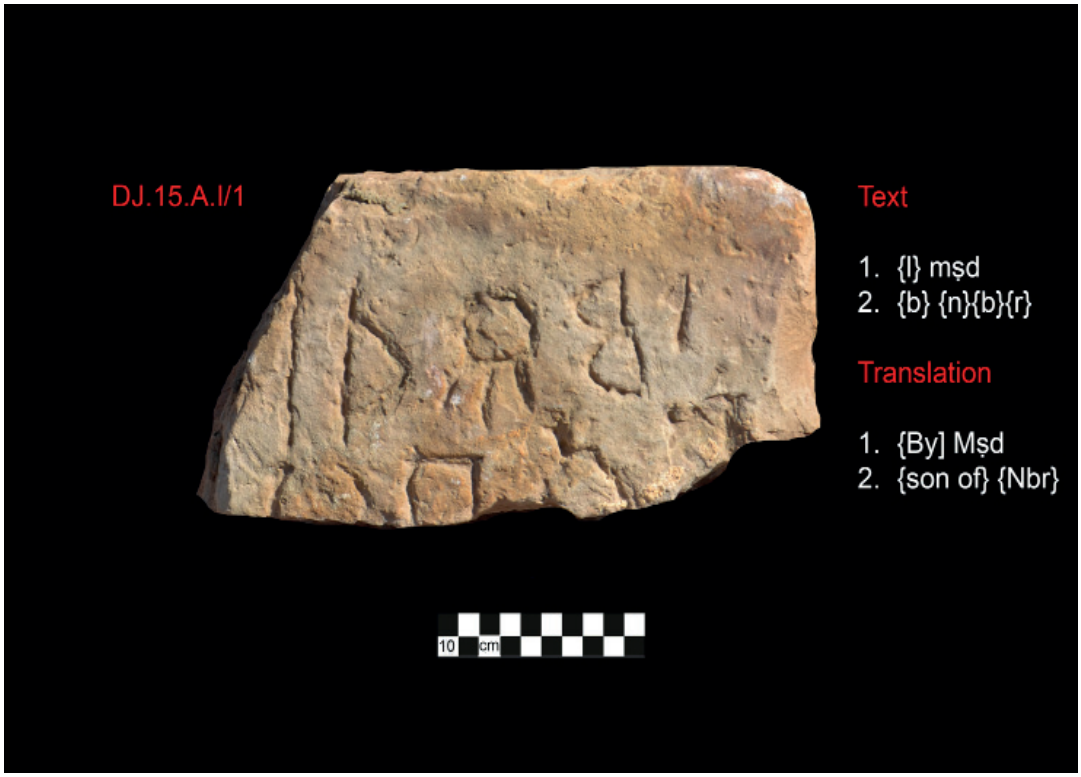


Fig. 4. The Taymanitic inscription from the level 3a

Fig. 5. Plan of the 2015 excavated structures in trench 1

Fig. 6. Level 29 above M34, view from east

Fig. 7. L48 delimited by M7, M34 and M39, view from east

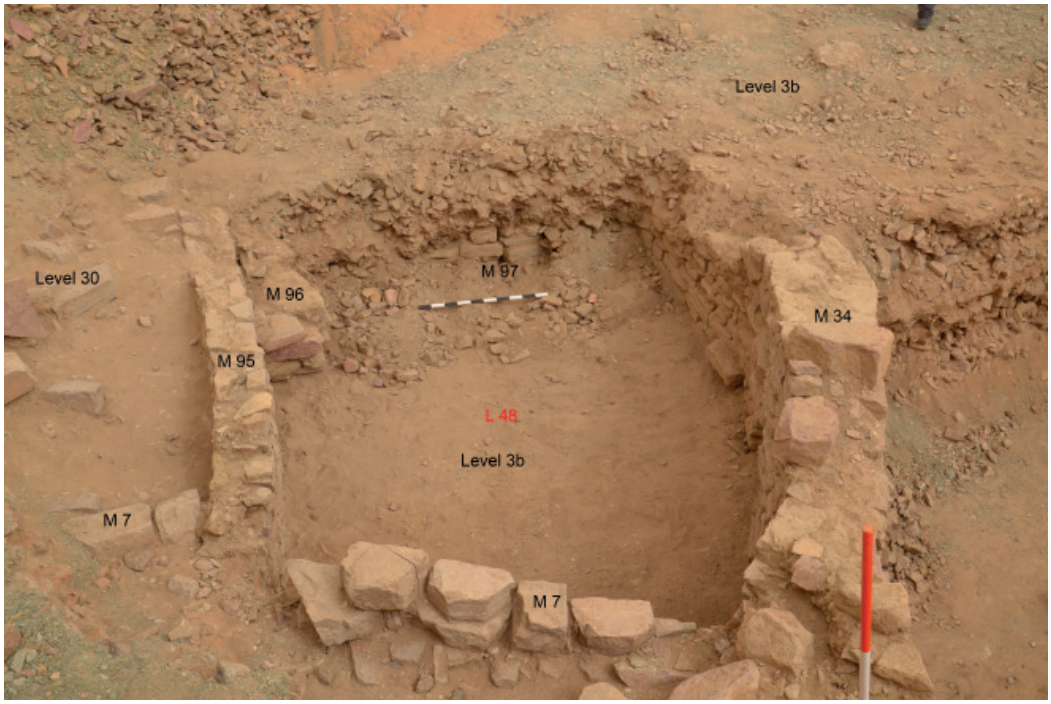


Fig. 8. L48 during the excavation, view from west

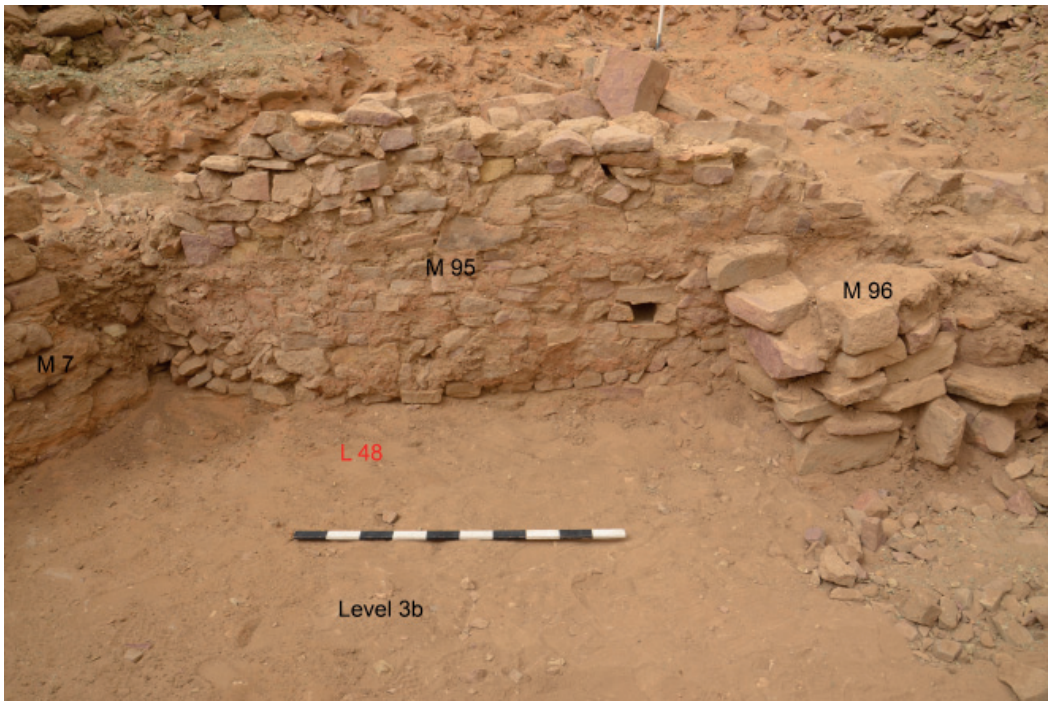


Fig. 9. Detail of M95-96, view from south

In conclusion, L 48 has an irregular plan with an area of 4.90 x 2.37 m. The walls that delimit it (M34, M7, M95 and M97), as well as the bench in the center of the locus (M100) and the structure in the south-west corner (M101), lie directly on the rocky ground. On the basis of comparisons with Building A and the later structures, two chronologically different building techniques can be detected. Looking at M95 one can distinguish pseudo-isodomic rows in the lower part of the wall, for a height of 0.67 m, comparable to the Nabataean masonry of Building A, and the irregular blocks arranged unevenly in the upper part of M95, together with clay mortar, resulting from the Islamic re-occupation of the locus. Furthermore, traces of red plaster can be seen on the Islamic period wall face (**Fig. 12**), which find comparisons with two walls (M31 and M16) that define the limits of an Islamic period locus (L15) located to the south-east of Building A.[12]

Finally, the rocky stratum on which locus 48 rests, shows the same traces of intentional cutting of the rock to obtain a flat surface on which impose the Nabataean structure, exactly how it appeared for the foundation of Building A (**Fig. 10**).

Fig. 10. L48 after the excavation, view from east

12. Loreto 2016a: 121.

Fig. 11. L48 after the excavation, view from west

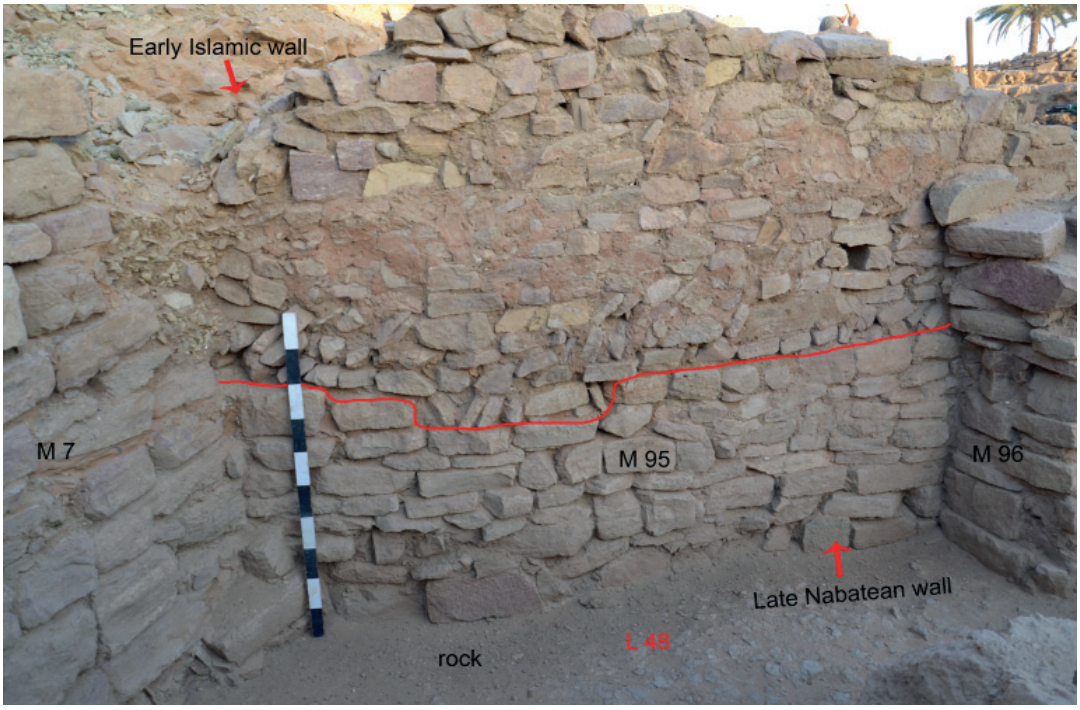


Fig. 12. Detail of M95's different building techniques and red painted façade

L49

At the same time to the excavation of L48, a new locus (L49) was deepened and identified immediately north of L48.

The removal of level 3a made it possible to discover a collapse level (level 30) composed of well-shaped sandstone blocks related to M7, which constitutes the western limit of the environment in question (**Fig. 13**). The failure of these blocks could have been caused by the thrust of the debris (levels 3a-b) deposited behind M7 or collapsed from the talus, whose highest rows have yielded to the weight.

From level 30 a circular clay object was recovered covered with a red-orange engobe and a decorative ring motif engraved under two grooves (DJ.15.A.O/113) (**Fig. 13**). At the moment this artifact constitutes a unicum among the objects found in Trench 1. Due to the shape that this find evokes, it could be interpreted as a token. Tokens referable to the Neo-Assyrian ones from Nimrud were also found in Tayma: most likely these objects were trivially used as game elements[13].

Below level 30, a light brownish layer emerged with stone chips and predominantly pre-Islamic ware (level 31) (**Fig. 14**). Starting from the removal of this last level, a new wall structure (M98) was identified in pseudo-isodomic rows in the north-west/ north-east boundary of the L49. M98 is connected to M7 and M95, ultimately making visible a triangular room with an area of 3.50 x 4.00 m (**Fig. 5**). In the terminal section of M98, at the point of rejoining with M7, an arched structure (M100) in blocks of 0.9 x 0.8 m was finally found which seems to act as an access system to L49; the latter, in fact, does not have any doors or windows of any kind (**Fig. 15**).

Also in L49, as seen in L48, M95 presents two different masonry that refer to two different archaeological phases: in the lower part one can see the arrangement of the blocks in pseudo-isodomic rows of the Nabataean period, while in the upper part there is an implementation with irregular blocks, at times arranged in a herringbone pattern, which can also be found in the Islamic period structues (i.e. M11) built above Building A (**Fig. 16**).

At the base of M7 and M95 it is possible to appreciate two traces of what originally must have been a white ṭin coating that covered the rock floor of the locus (**Figs. 16 and 17**). Probably, based on what was seen in Building A, the entire wall face had to be covered with this plaster. The upper part of the walls, i.e. the later part, preserves evidence of a yellow ṭin coating whose traces, however small, are still visible on the exposed side of M7 and on each wall face of M95 (**Fig. 18**).

13. Hausleiter 2010: 231.

Fig. 13. Level 30 inside L49, view from north-east

Fig. 14. Level 31 above level 30, view from east

Fig. 15. M100 between M7 and M98, view from south

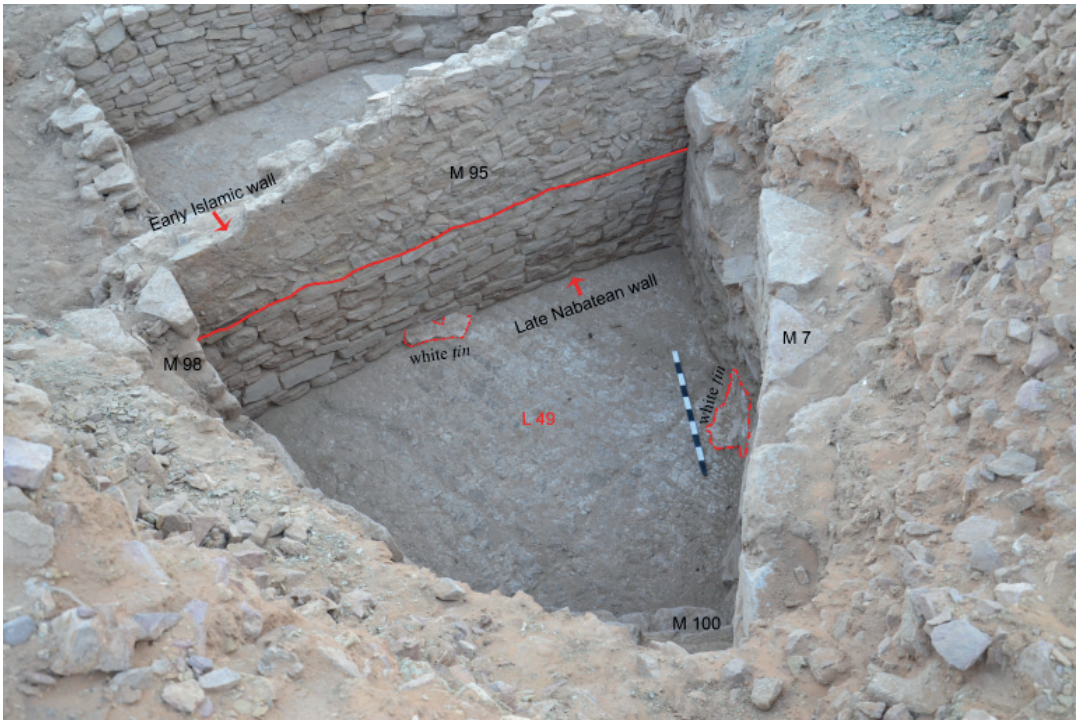


Fig. 16. M95's different building techniques and detail of the two white ṭin traces, view from north

Fig. 17. Detail of the white ţin on the floor and M98's base, view from south-west

Fig. 18. Detail of yellow ţin on M7 and M95

New data about the ancient urban area east to the castle of Mârid

The excavation activity resulted in the discovery of two adjacent rooms, L48 and L49, at the north-west limit of Trench 1 (**Fig. 19**). Both rooms are aligned with L10a-b and L14 along the longitudinal axis north-west/south-east, following a different trajectory from the Nabataean Building A which, in part, is cut from L10. The longitudinal plan of these rooms (L10a-b, L14, L48, L49) would seem to be due to the geological conformation of the talus of the castle (**Figs. 20 and 21**).

M7, in consideration of the pseudo-isodomic row technique and of the pottery found among its foundation rows, goes back to the Nabataean period and was reused as the western limit of the Islamic period structures (**Fig. 21**). The latter also include L48 (4.90 x 2.37 m), whose north and south perimeter limits, consisting of M95 and M34 respectively, are set against M7 and together with M97, the eastern limit of the environment, date back to Islamic period, with the exception of the pseudo-isodomic rows of M95 that are from the Nabataean period.

Fig. 19. L48 and L49, view from west/south-west

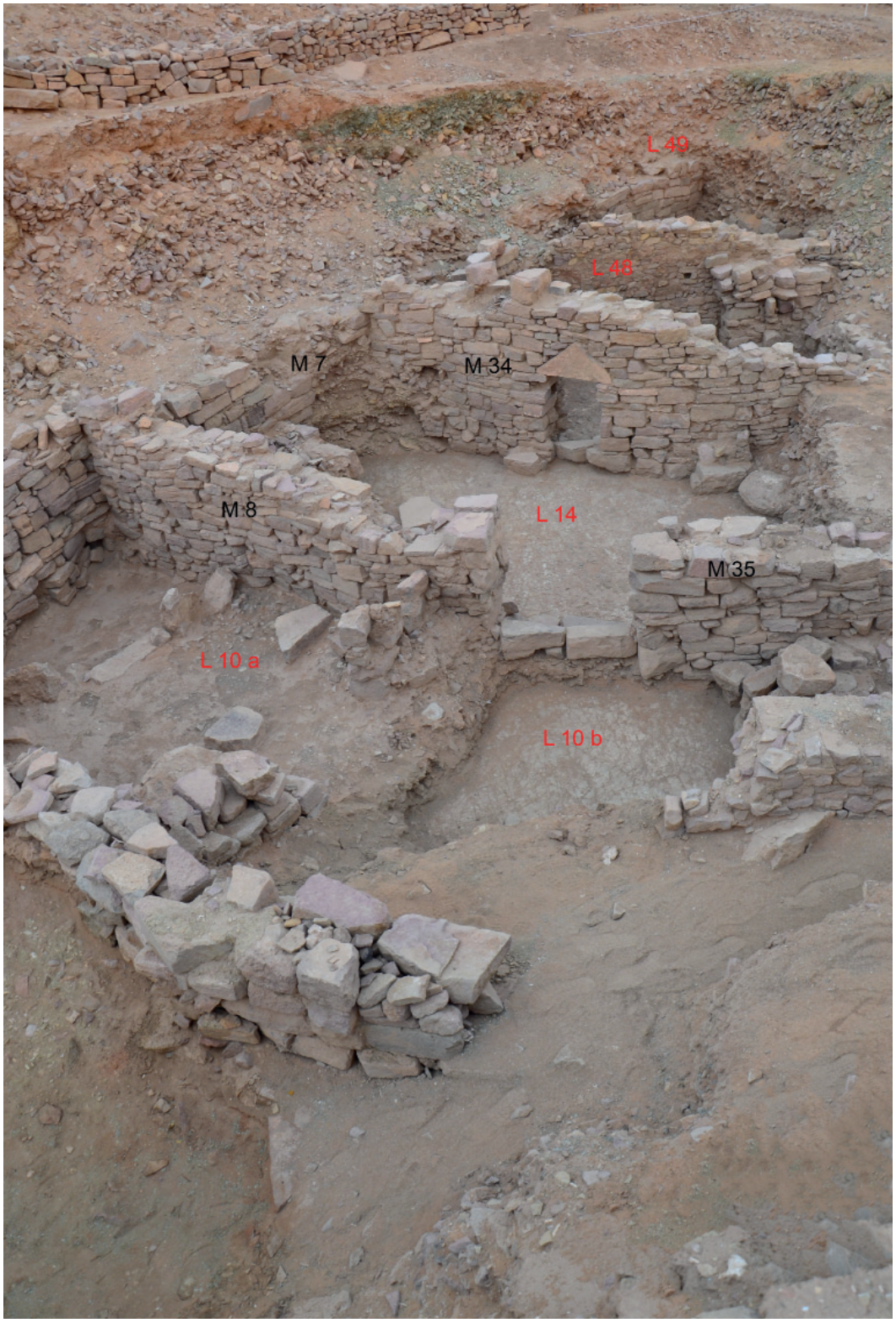


Fig. 20. Longitudinal alignment of environments L10 a-b, L14, L48 and L49, view from south

Fig. 21. Longitudinal alignment of environments L10 a-b, L14, L48 and L49, view from east

The room in question, in terms of shape and size, is to be interpreted as a place intended for the storage of goods such as food, liquids, means of production, etc.; the bench (M 99), found in the center of L48, may have been used as a possible surface for support and/or processing (**Fig. 22**).

Interesting details are the presence of a protruding block with a flat section in M34 for the possible housing of a lamp (**Fig. 22**); a quadrangular recess in M34 door for the insertion of a door's wooden element (**Fig. 22**); in M95 another recess for the insertion of a support of perishable material such as wood (**Fig. 23**). A final piece of furniture is made up of M101 which, as well as M99, may have fulfilled a common function of support surface (**Fig. 10**).

Access to L48 is granted by a small passageway (0.80 x 0.70 m) in M34, coming from L14. The latter, in turn, is joined to L10a-b through a passage that opens between M8 and M35. The direct connection between these rooms, as well as the same construction technique of the perimeter walls, would suggest a common belonging to a large architectural agglomeration of the Islamic period (**Fig. 24**). However, while the first two annexes (L10a-b and L14) rest on the Nabataean structures of Building A, the preparation floor on which the foundations of the Building A itself, L48 and L49 lay, insist directly on the rocky virgin soile.

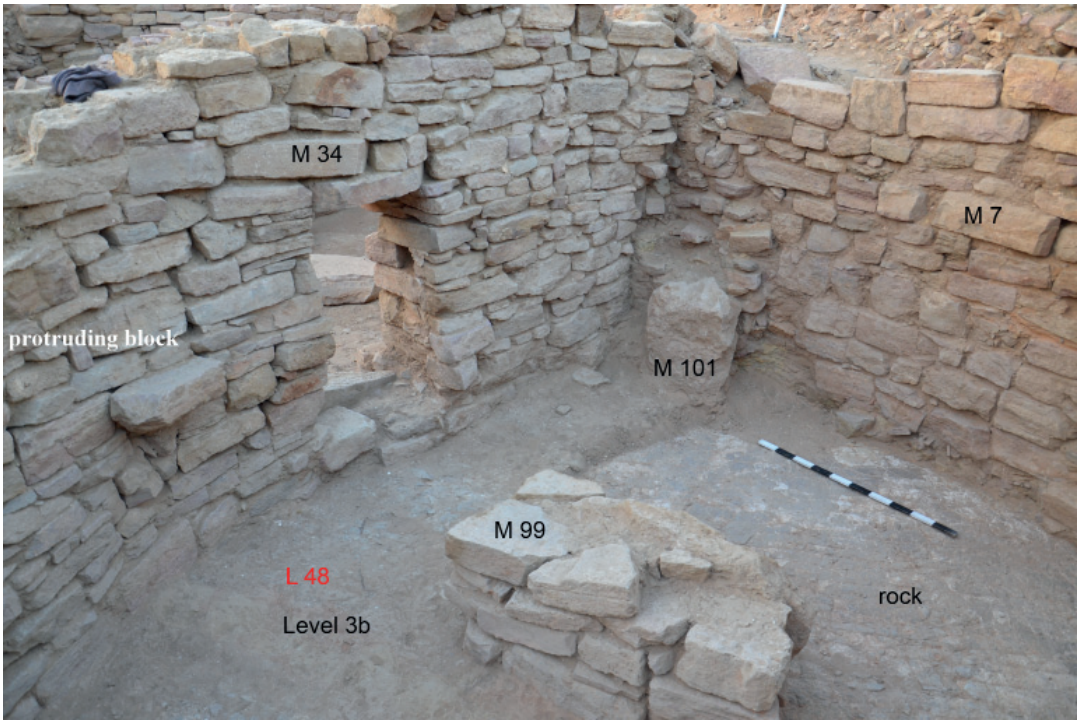


Fig. 22. Detail of L48, view from north/north-east

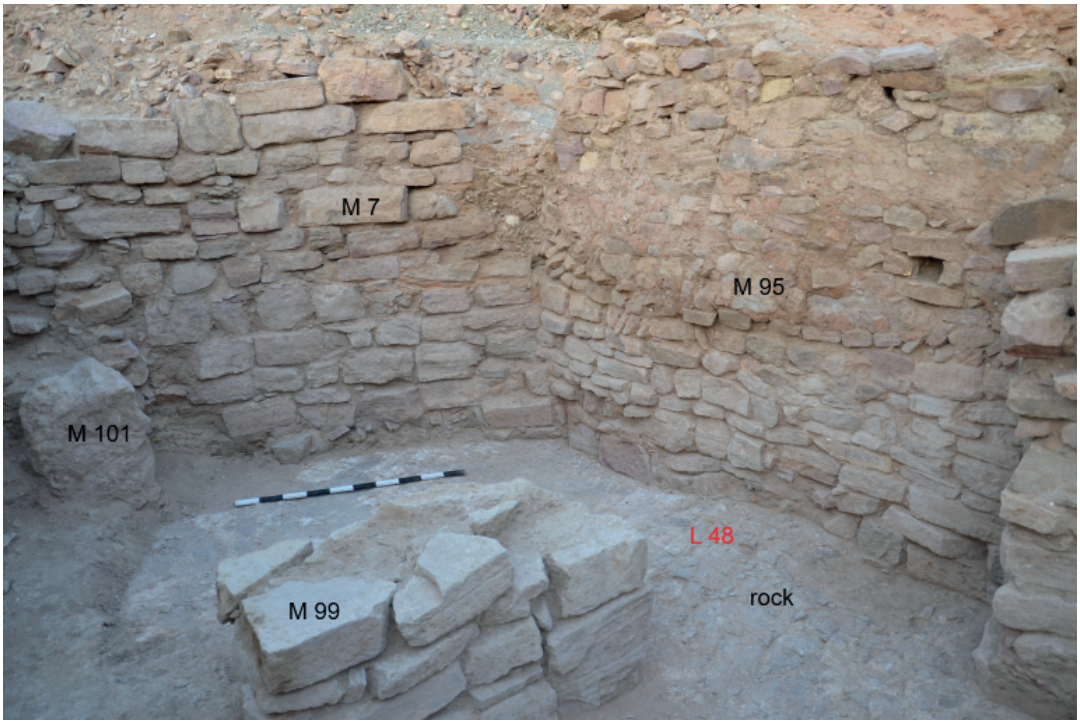


Fig. 23. Detail of L48, view from south/south-east

Different is the case of L49 (3.50 x 4 m) which, in consideration of the particular triangular planimetry (3.50 x 4 m), the building technique of the walls and the presence of minute but significant residues of waterproofing plaster at the base of M7 and M95, would perhaps represent a cistern or storage area from the Nabataean period that was adopted in the Islamic period (**Fig. 16**). The rearrangement of the elevation of M95 with irregular blocks, the yellow tin coating on the wall faces of M95 and M7, limited to the upper part (**Fig. 18**), and the presence of evident remakes with blocks and raw earth in some depressions visible along the surface of M7, can be considered re-arrangements of the Islamic period.

Thus, looking at the whole picture (**Fig. 25**), it appears that Building A was served by a functional building to its north (Building B, made of L48 and L49); also, one should consider the possibility that the whole extension of Building A was far more vast than previously recorded, including L48 and L49. In both cases, one has the confirmation of the luxury complex of Building A.

Fig. 24. General view of the whole Islamic re-arrangement of the Nabataean area north to Building A, view from south-east

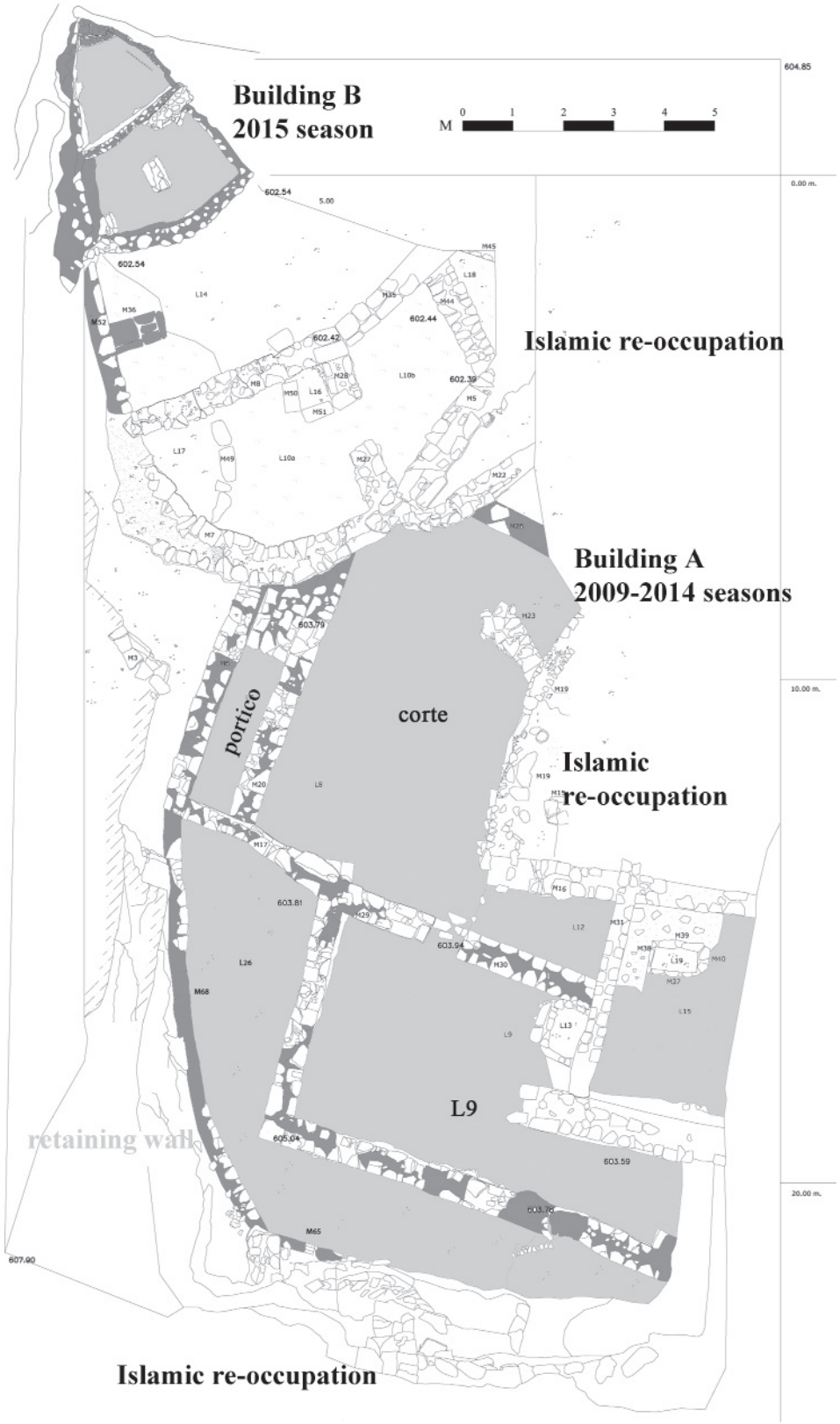


Fig. 25. Plan of the complete residential area

Appendix. Details of the masonry for a chronological definition of the excavated structures

The wall structures found during the 2015 excavation campaign could be related to at least two different historical phases: the wall related to the Nabataean period, but also Roman-Byzantine (2th-6th century AD), and the Islamic re-occupation of Sector A.

Wall structures of L 48

L48 is bordered by four sandstone block walls: M7 (western limit), M34 (southern limit), M95 (northern limit) and M97 (eastern limit). M7 is equipped with only one curtain wall; it has a length of 1.80 m and a height of 2.50 m. The blocks that are part of it are not homogeneous from a morphological point of view: some have a parallelepiped shape, others a rectangular shape. The same structure is supported by M101, an irregularly shaped structure consisting of flat blocks and a large irregular stone arranged vertically (**Fig. 26**).

M34 is a double curtain wall structure, with a curvilinear pattern, with a thickness of approx. 0.5 m, a length of 4.90 m and a maximum height of 2.16 m. The rows of the inner curtain are discreetly aligned and the blocks are morphologically not homogeneous: both parallelepiped and rectangular blocks of good quality and irregularly shaped small and medium-sized blocks are visible randomly over the entire surface of the wall. The access compartment, with an opening of 0.7 x 0.8 m, has a raised threshold of 0.2 m approx. on the walkway and is surmounted by a parallelepiped lintel (**Fig. 27**).

M95, a double curtain wall structure, has an average thickness of 0.25 m, a length of 3.45 m and a height of 1.80 m. Leaning against the same structure, at the eastern limit, is M96, a 1.20 x 1.08 m reinforcement structure, made up of large and medium-sized blocks. Ultimately, M95 is characterized by at least two different archaeological phases: in the lower part of the wall face, rows of pseudo-isodomic nature related to the Nabataean period are in fact visible, while in the upper part there is a masonry arranged unevenly that goes back to the Islamic period (**Fig. 28**).

M97 (1.00 x 2.80 m) has rather coarse rows of irregular blocks and stone slabs arranged edgeways (**Fig. 29**).

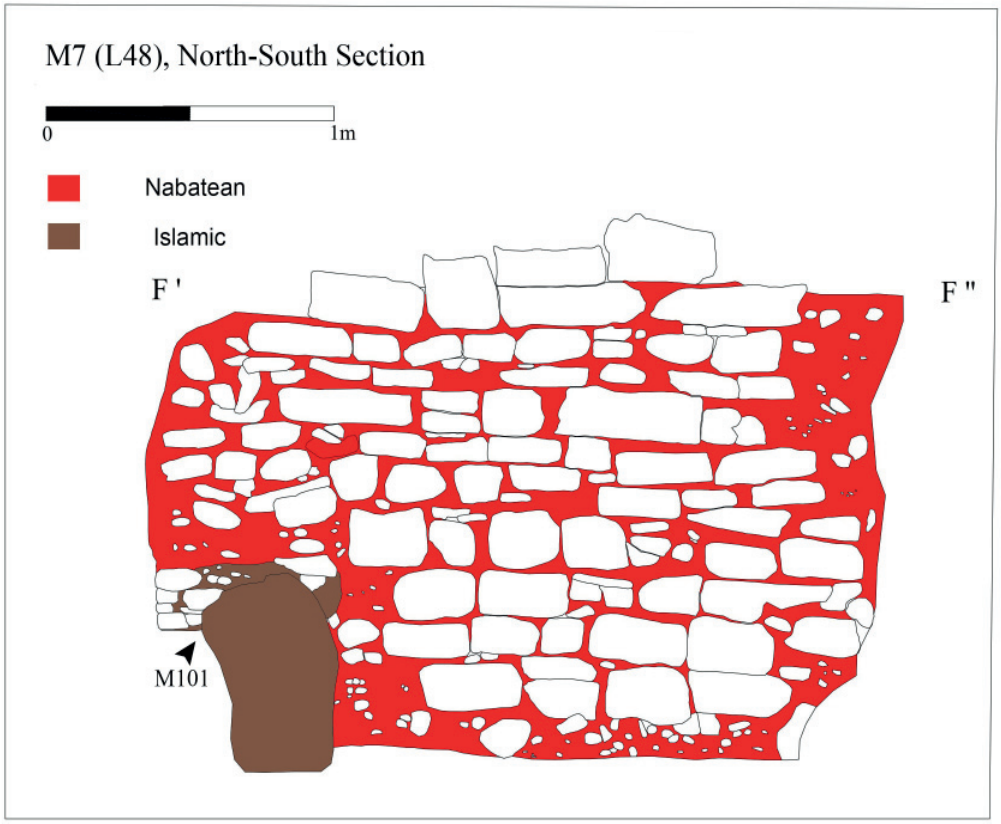


Fig. 26. North-south section of M7 and M101, L48 (F'-F'')

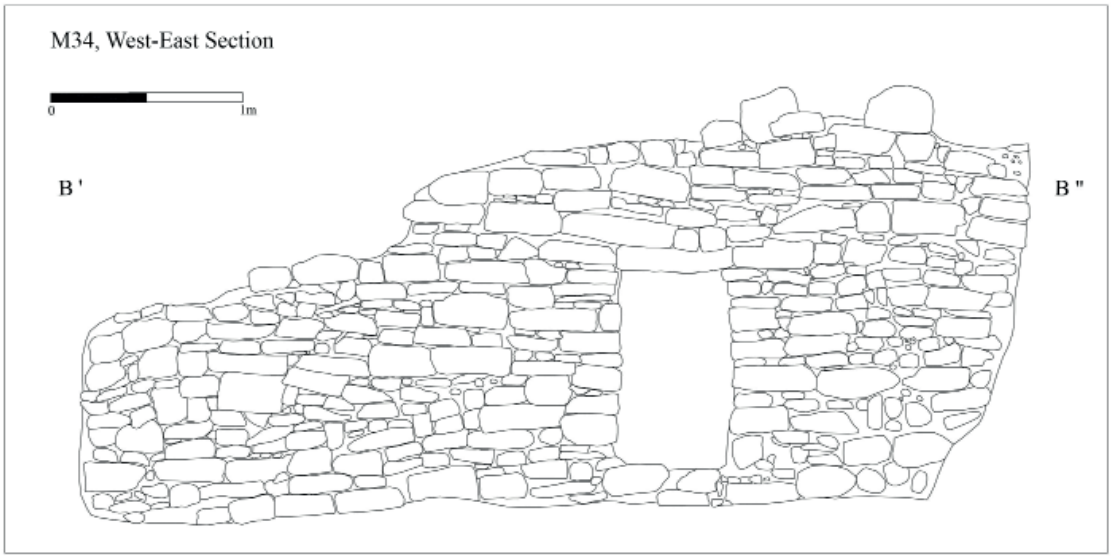


Fig. 27. West-east section of M34 (B'-B'')

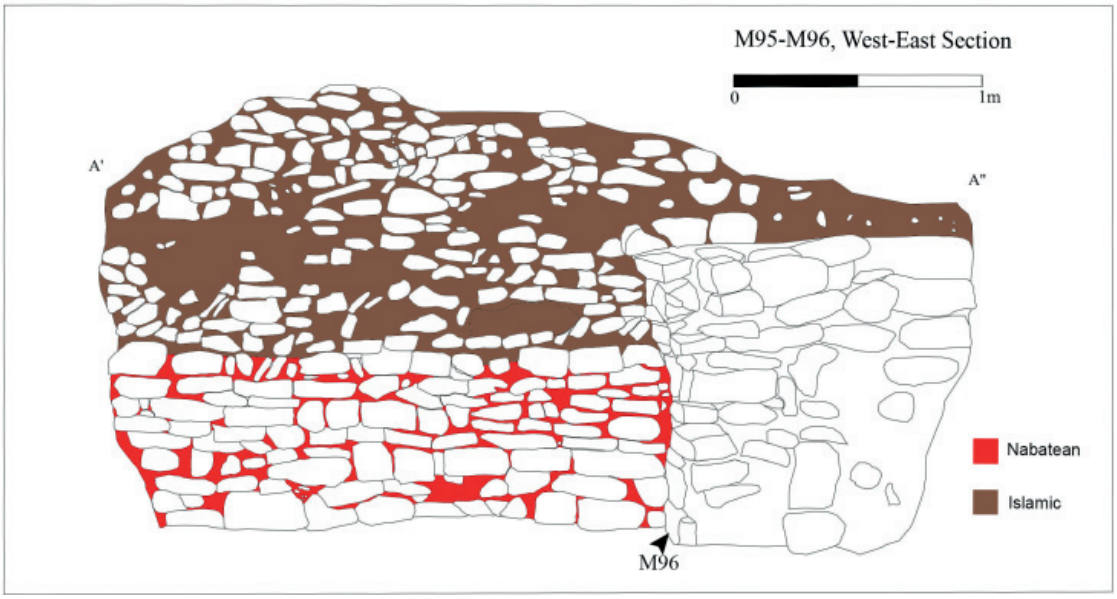


Fig. 28. West-east section of M95, L48 (A'-A'')

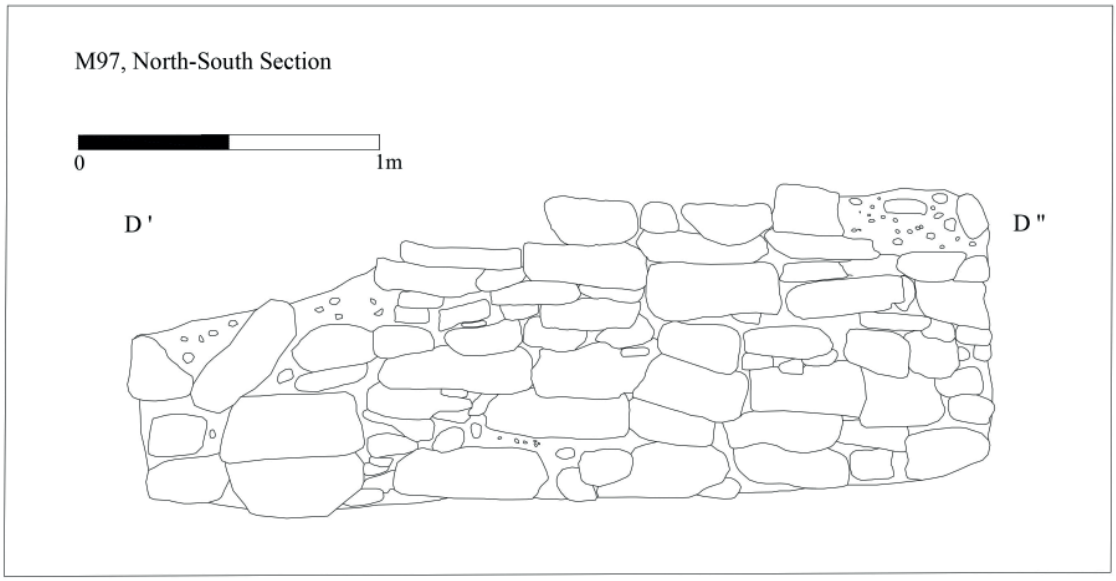


Fig. 29. North-south section of M97 (D'-D'')

Wall structures of L49

L49 is bordered by three sandstone block walls: M7 (western limit), M95 (southern limit) and M98 (northern limit).

M7 has a length of 3.72 m and a height of 1.70 m. Of the original wall structure only the of large blocks in the upper rows are preserved. In general, there are wide damages on the entire curtain wall filled with small and irregular blocks and raw earth. In fact, M7 suffered the pushing of materials coming from the acropolis talus. The irregular blocks placed in the middle part of the wall are to be seen as renovations. Noteworthy are the traces of ṭin, visible both in the upper part of the wall face (**Figs. 18-19**) and in the lower part (**Fig. 30**).

M95, a double curtain walls, has a length of 3.74 m and a height of 2.04 m: two different building techniques are recognizable in analogy with the south facade of the wall in L48. In the lower part of the wall, the pseudo-isodomic rows of the Nabataean period characterized by mainly oblong blocks are very well preserved. In the upper part there is a predominance of irregularly shaped blocks arranged unevenly over the entire surface of the wall; in some places the blocks are inserted in a herringbone pattern (**Fig. 31**).

M98 shows a pseudo-isodomic masonry in a good state of preservation, 2.30 x 1.05 m wide; M100 rests at its north-west limit. M100 is a structure in sloping blocks with a threshold in flat slabs at the top, probably to be interpreted as the access stairway to L49 (**Fig. 32**).

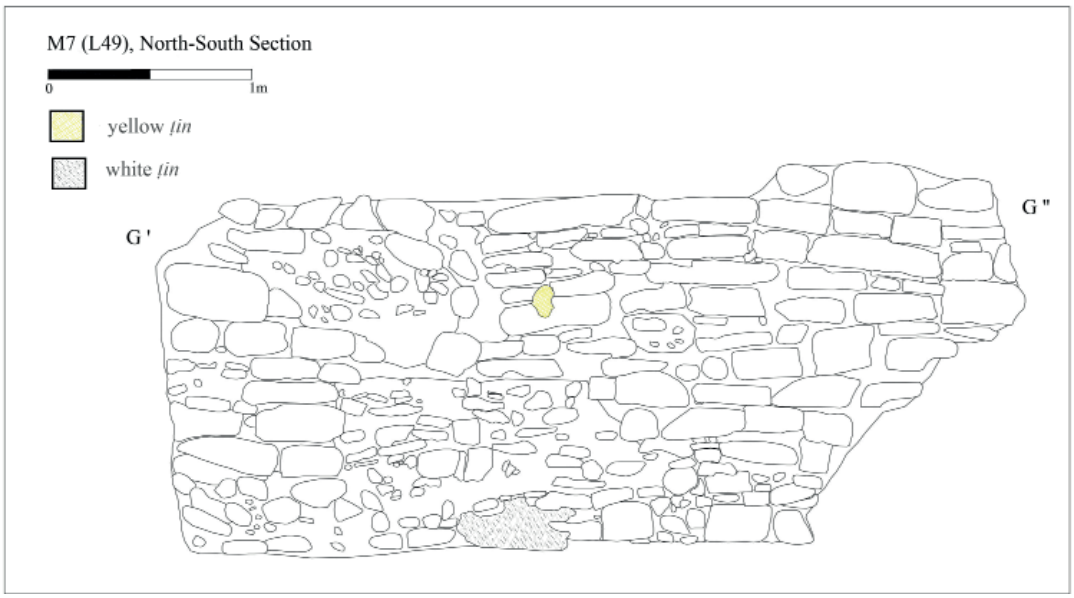


Fig. 30. North-south section of M7, L49 (G'-G'')

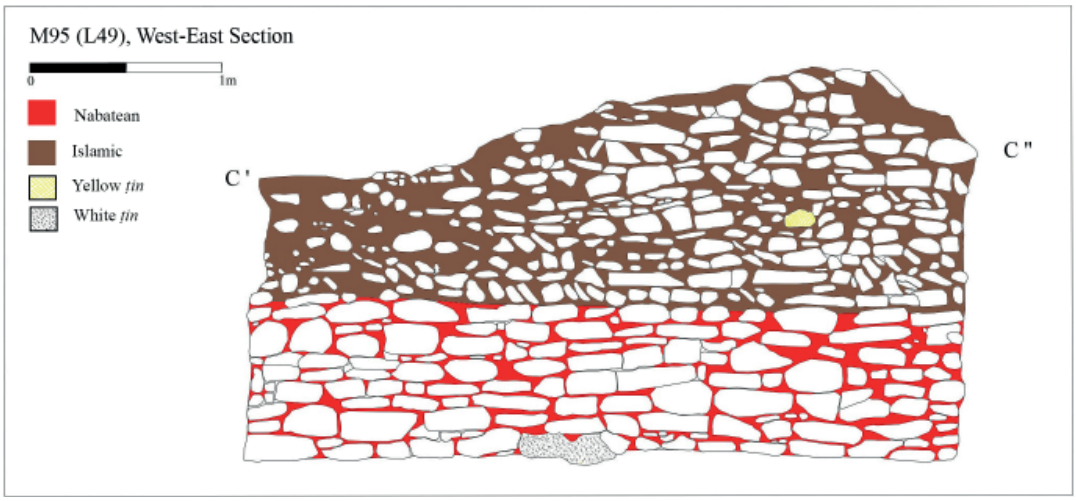


Fig. 31. West-east section of M95, L49 (C'-C'')

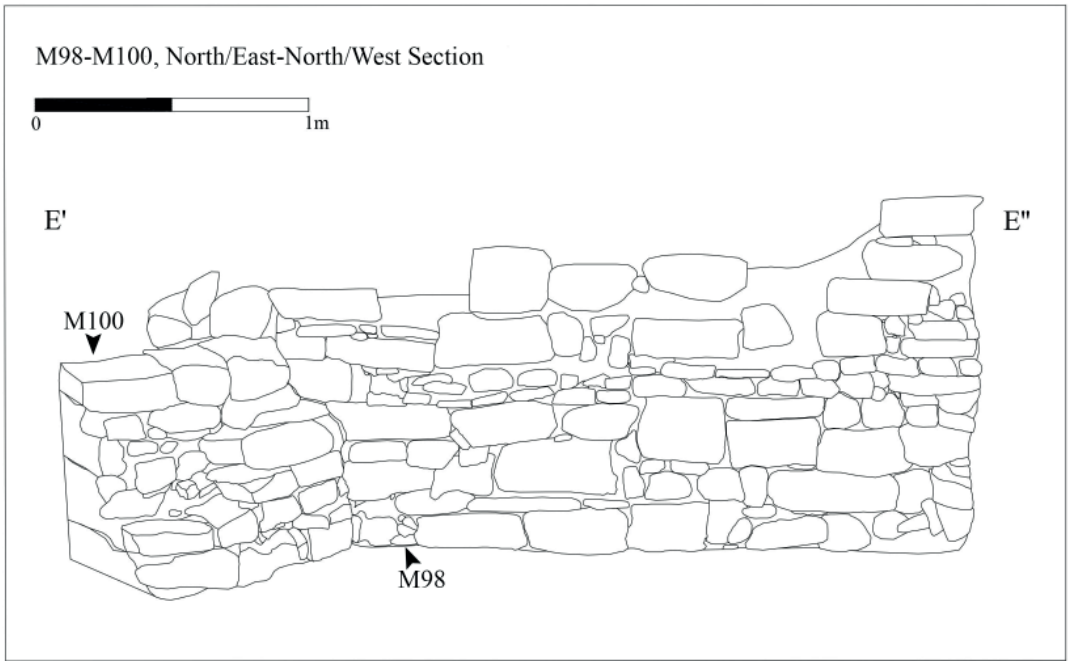


Fig. 32. North-east/north-west section of M98 and M100 (E'-E'')

Excavations inside the Mârid Castle

Romolo Loreto [1]
Teodoro Cocozza [2]

Introduction

Trenches 8 and 9 (both 5 x 5 m ca.) were opened inside the castle, in its open courtyard, following the work accomplished in 2014 (**Fig. 1**).[3] These two trenches were opened close to the southern entrance to the courtyard, as well as close to the location of al-Mu'ayqil's probe carried out before the restoration of the castle (1986).[4] According to the state of preservation of the castle and in light of the restoration work, the eastern part of the open courtyard seems to be the only area where archaeological probes could had been performed.

Fig. 1. 2015 excavations inside the Castle of Mârid

1. University of Naples *L'Orientale.*
2. Student, University of Naples *L'Orientale.*
3. Loreto *et al.* forthcoming 2021.
4. Loreto *et al.* forthcoming 2021.

Both trenches suffered a partial damage of their stratigraphic sequence due to the restoration activities, so that only the very deep stratigraphic units preserved some *in situ* materials (Assyrian, Nabataean) or structures. On the contrary, the upper levels excavated are the result of the restoration/consolidation procedures, with Islamic and Ottoman materials. Thus, only the *in situ* material is considered, that is the pre-Islamic one.

The excavation

Trench 8

Trench 8, close to the southern entrance to the courtyard, was defined as an L shape trench in order to investigate as much surface as possible between the entrance to the courtyard and the south-eastern staircase leading to the upper castle's fortification (**Figs. 2 and 3**).

The beginning of the stratigraphic sequence comprises three levels resulted from the restoration activities: level 1a-b, the present day floor (1a) with its preparatory layer made of *breccia* (1b); and level 2, a mixture of fragmentary stones and discharged materials from the 1986 restoration.

Fig. 2. Location of Trench 8, view from north-west

Level 3, a compacted mud floor is the first stratigraphic element related to a modern or medieval floor level, partially destroyed by level 4, a pit mechanically produced and related to the restoration activities. Some Islamic sherd and a typical terracotta Ottoman pipe, already recorded in Trench 1, were collected from level 4 (**Fig. 3**).[5]

After the removal of the southern part of level 3 (no more than 20cm thick) a first architectonic element emerged (Mc1). Wall Mc1, east-west oriented, is covered by level 5, a stratigraphic unit composed by abundant charcoal mixed to mud. Level 5 cover a second floor, level 6, once again a compacted mud floor. Mc1 rests on level 6, defining what apparently seems the first clear structure related to an ancient period of time (**Figs. 3 and 4**).

Proceeding with the northern part of level 3, a second east-west oriented wall arose (Mc2), defining the trench into two loci: *locus* 1, to the south of Mc2, and *locus* 2, to the north of Mc2 (**Fig. 4**). Mc2, along its northern side, is covered by level 7, a thin layer of sand followed by level 8, a proper compacted mud floor built directly above a rocky stratum, surely the virgin soil. Level 8 revealed some significant pottery elements, in particular a bowl of *eastern sigillata orientale* (2nd BCE), fragments of Nabataean luxury ware (eggshell) (1st-2nd cent. CE), and some Nabataean local common ware (1st-2nd cent. CE) (**Figs. 9 and 11**).[6] The emergence of these pottery elements is particularly significant for the identification of the architectonic element emerged in Trench 9, as it will be discussed below.

A complete description of the pottery assemblages collected in Trenches 8-9 follows below.

Trench 9

Trench 9 stratigraphic sequence suffered more damage than Trench 8, due to the 1986 restoration activities (**Figs. 5-6**). Nonetheless, in the deepest level of this probe, a first clearly Nabataean imposing structure was identified, connected with level 8 in Trench 8.

Starting from the surface, level 1a-b is the same stratigraphic unit identified in Trench 8; level 2 is a huge (1.50m deep ca.) level of discarded materials related to the restoration activities, made of stones, earth and modern plastic fragments which correspond to the level 4 in Trench 8, i.e. the pit. Level 2 covered, to the east, level 3 and the remains of a west-east oriented wall (Mc3) (**Fig. 6**). Level 3 is a layer of mud associated to a badly preserved wall Mc3. From level 3, fragments of *opus tessallatum* mosaic emerged, composed by red and white *tessera*, such as the mosaic floor identified by al-Mu'aykil in his pre-restoration probe (**Fig. 7**).[7]

5. See Loreto & Polosa in this volume.
6. Loreto 2018a.
7. Loreto *et al.* forthcoming 2021.

Fig. 3. Trench 8 stratigraphic sequence, view from east

Fig. 4. Trench 8 stratigraphic sequence, view from east

Fig. 5. Opening of Trench 9, view from north-west

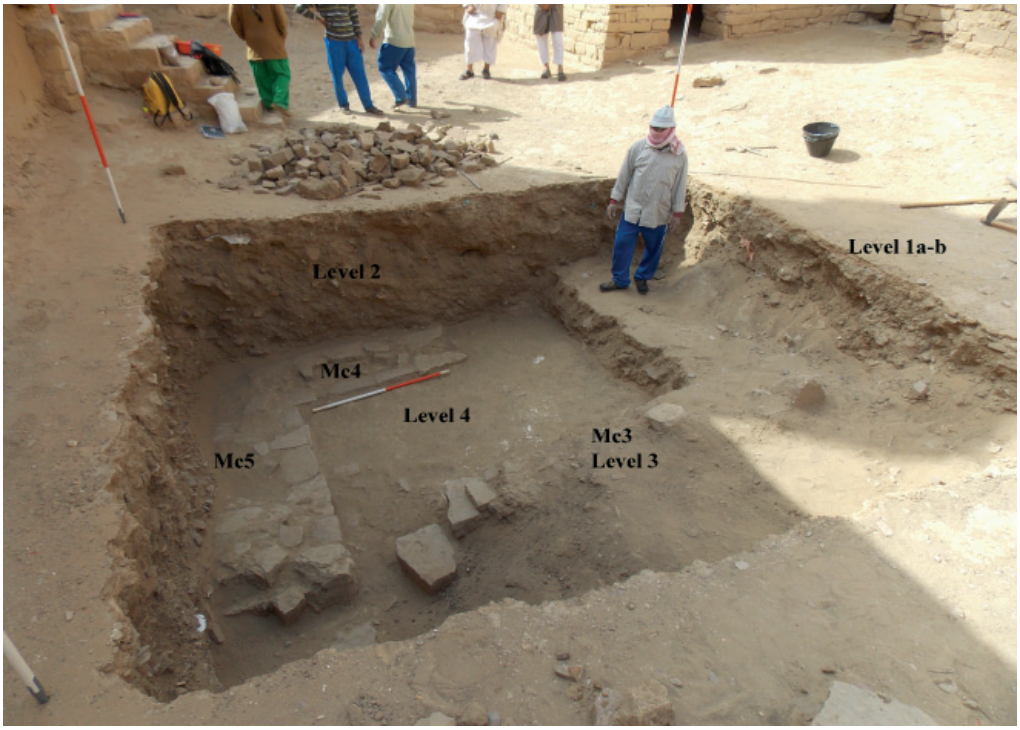


Fig. 6. Trench 9 stratigraphic sequence, view from north

Fig. 7. Late Antique *Opus tessellatum* from level 3

After the complete removal of level 2 and the partial removal of level 3, the excavation brought to light the very first Nabataean structure inside the Castle's area, what now can be definitely defined as the ancient acropolis. The Nabataean structure is part of a huge room defined by two impressive walls 0.65 m thick, preserved for only two to three courses (**Fig. 8**). The room and its floor, as well as the walls, were covered by white mortar, according to the same masonry technique recorded in Buildings A and B in Trench 1, that is the Nabataean residential area at the foot of the eastern side of the acropolis. The floor (level 5), covered by a thin layer of soil (level 4), rests above the virgin rock, so it can be attribute to level 8 in Trench 8, suggesting that the whole open courtyard was paved with a thick (20 to 30cm) compacted mud floor, with the insertion of small flat stones, completely covered by white *ṭin*, a water proof plaster.

Moreover, within trench 9 a single peculiar vessel arose, whose importance emerged after the 2016-2019 campaign in the core of the ancient oasis, close the ʿUmar mosque, where a *corpus* of Assyrian ware was discovered. The item from Trench 9, although a single occurrence not in an untouched stratigraphic context (level 2), is the first pottery element ascribable to the Assyrian ware tradition (**Fig. 29**).

Fig. 8. Orthorectified plan of Trench 9

The pottery assemblages from Trenches 8-9, preliminary display

This classification of the pottery collected from Trenches 8-9 follows the partial publication of the Nabataean ware from the excavation of Building A.[8] For this reason, the same criteria are adopted: the classification is based on both technical features and the most common morphological, dimensional and functional features of the same chronological and cultural horizon. On this regard, the *eastern terra sigillata* (**Fig. 9**) and eggshell luxury Nabataean imported ware from level 8 (**Fig. 10**) are very well known types attested in the Levant. The pottery from levels 4 and 7, on the contrary, as well as the Nabataean common ware from level 8 (**Fig. 11**) are local productions (Type IV.A.1 tronconical bowls).

Fig. 9. *Eastern sigillata orientale* from level 8 (1st-2nd BCE)

8. Loreto 2012; moreover, Loreto 2018b introduces the typological criteria. In light of the 2016-2019 excavations in the historical core, after a huge collection of further Nabataean material, a comprehensive study of the Nabataean ware is ongoing.

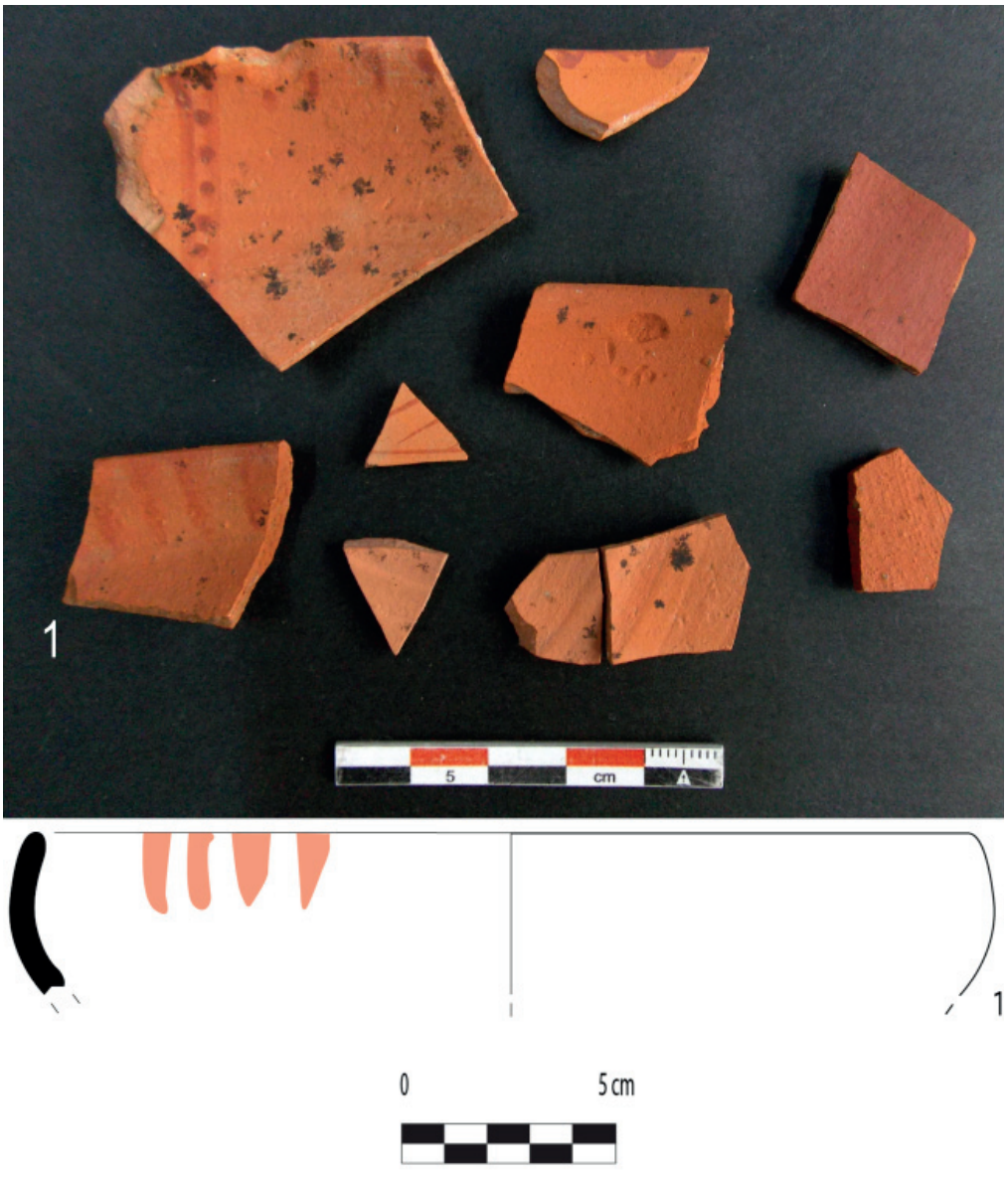


Fig. 10. Nabataean luxury ware from level 8 (1st-2nd cent. CE)

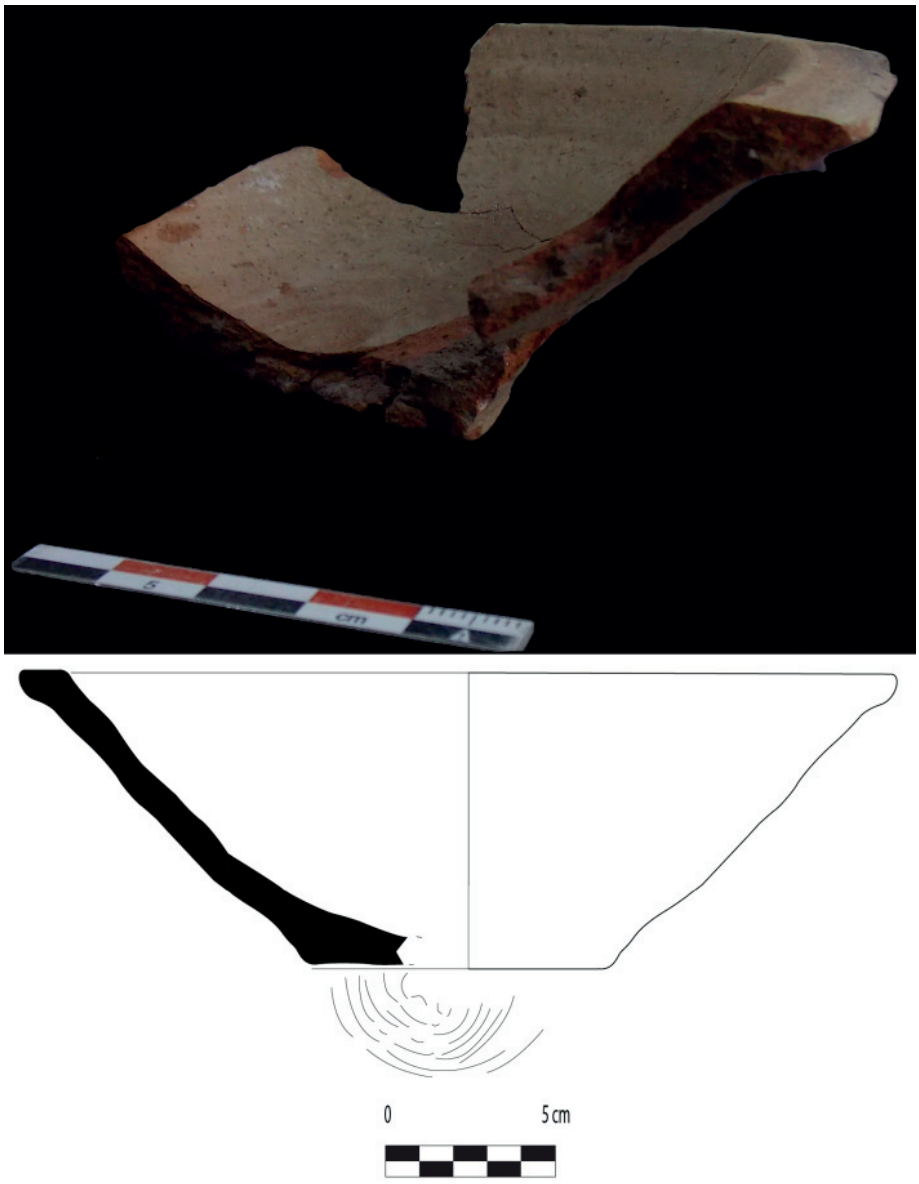


Fig. 10. Nabataean local common ware from level 8. Class IV.A.1, tronconical bowl

Among the local productions, seven fabrics (out of ca. twenty fabrics recognized in the whole oasis) were identified: three of them fine fabrics (**Fig. 12**), four of them coarse ones (**Fig. 13**).[9] Thus, the materials are arranged according to formal and dimensional features in a system based on geometric criteria. The typological classification is based on classes, shapes and types. The class identifies a group of individuals that share common features (fabric, technology, typological repertoire). For example, the class of the Nabataean imported fine painted ware, the class of the local fine ware or the decorated local ware, the local common ware (the latter is the vast majority), and the glazed ware. The shape identifies a group of vessels that share typological feature linked to a peculiar function. For example, bowls, jars, etc. The type identifies the specific articulation of every shape. For example, carinated bowls, tronconical bowls, etc. Finally, the sub-type could identify the variability and articulation of the types. For example, carinated bowls with rounded or everted rim or low, medium or high carination, etc.

Fig. 12. Fine fabrics

Fig. 13. Coarse fabrics

Up to now, in light of 2009-2015 excavations in trenches 1-9 and based on synchronic comparisons from other Nabataean contexts (both from the Levant and Northern Arabia),[10] the typological classification of the Nabataean ware from Dûmat al-Jandal comprises:

Classes Based on already known types or local fine ware imitating Nabataean models

I. Nabataean imported ware.

II. Local fine ware.

III. Local decorated ware.

Shapes

I.A. fine painted ware (eggshell).

I.B. red painted ware.

9. In light of 2016-2019 excavation seasons and pottery study, archaeometric analyses are ongoing to better define the fabrics, first of all by separate local ones from imported ones, then to verify the usage of a same fabric during different period of time. Thus, the fabrics are not described here. What is already known is that number 1 is the most abundant fabric in the Nabataean period, Loreto 2018b.

10. Loreto 2018b.

I.C. red painted with impressed motifs.

I.D. impressed or incised ware.

II.A. carinated bowls.

II.B. cups.

II.C. jugs.

III.A. long neck jars.

III.B. ovoid jars.

III.C. globular jars.

III.D. bowls.

Types

II.A.1 carinated low wall bowls

II.A.2 vertical grooving wall bowl

Classes based on morphological, dimensional and functional criteria are

IV. Common ware.

V. Glazed ware.

Shapes

IV.A. bowls.

IV.B. jugs and bottles.

IV.C. jars.

IV.D. lids.

V. jars.

Types

IV.A.1 tronconical bowls.

IV.A.2 convex profile bowls.

IV.A.3 carinated bowls.

IV.A.4 vertical to oblique deep wall bowl.

IV.A.5 large basins.

IV.B.1 trilobated jug.

IV.B.2 jug with vertical rim.

IV.B.3 bottle with flaring rim.

IV.C.1 jars with angle profile neck.

IV.C.2 hole-mouthed jars.

IV.C.3 jars with short neck.

IV.C.4 high neck jars.

IV.C.5 ovoid jars.

IV.C.6 narrow neck jars.

IV.C.7 globular jars.

IV.D.1 carinated handle lids.

IV.D.2 tronconical lids.

Trench 8

Level 4

Bowls in **Fig. 14.1-3** are Type II.A.1, carinated low wall bowls; and bowl in **Fig. 14**.4 is Type II.A.2, vertical grooving wall bowl. The painted decorated bowl in **Fig. 15.1** is the only attested bowl of Class III in the oasis, at least at this stage of analysis. Bowls in **Fig. 16.1-15** are Type IV.A.1, tronconical bowls, with some variation in the rim, varying from round and flat (**Fig. 16.6-7**) to squared (**Fig. 16.1, 3**) or everted (**Fig. 16.8**) as well as in the orientation of the wall, more oblique in **Fig. 16.1-11** and less oblique in **Fig. 16.12-15**. Bowls in **Fig. 17.16-20** are Type IV.A.2, bowls with convex profile.

Jars in **Fig. 18.1-3** are Type IV.C.3, jars with short neck. Jars in **Fig. 19** are IV.C.5, ovoid jars. Some variation can be detected in the rim, varying from round to everted (**Fig. 19.3**), or thanks to the stat of preservation of the wall that still preserved horizontal handles suggestion a food processing purpose. A lid (**Fig. 20**) and 22 bases (**Fig. 21**) follow. Among the bases one recognises at least a preliminary difference between small bases related to consumption activities and large bases probably related to storage.

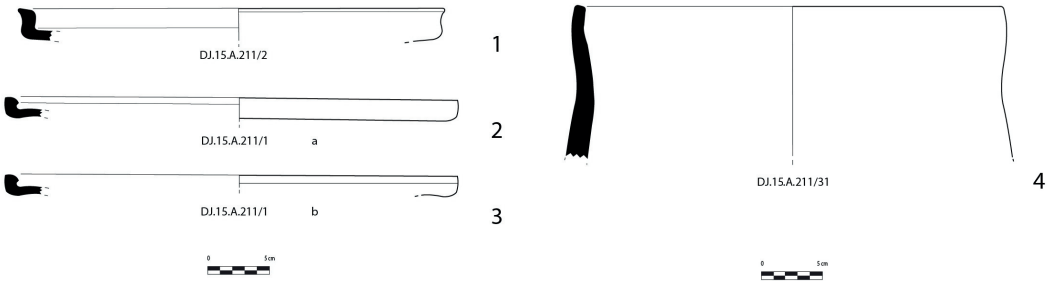


Fig. 14. Class II.A. Local fine bowls from level 4 in trench 8

Fig. 15. Class III.D. Local decorated bowl from level 4 in trench 8

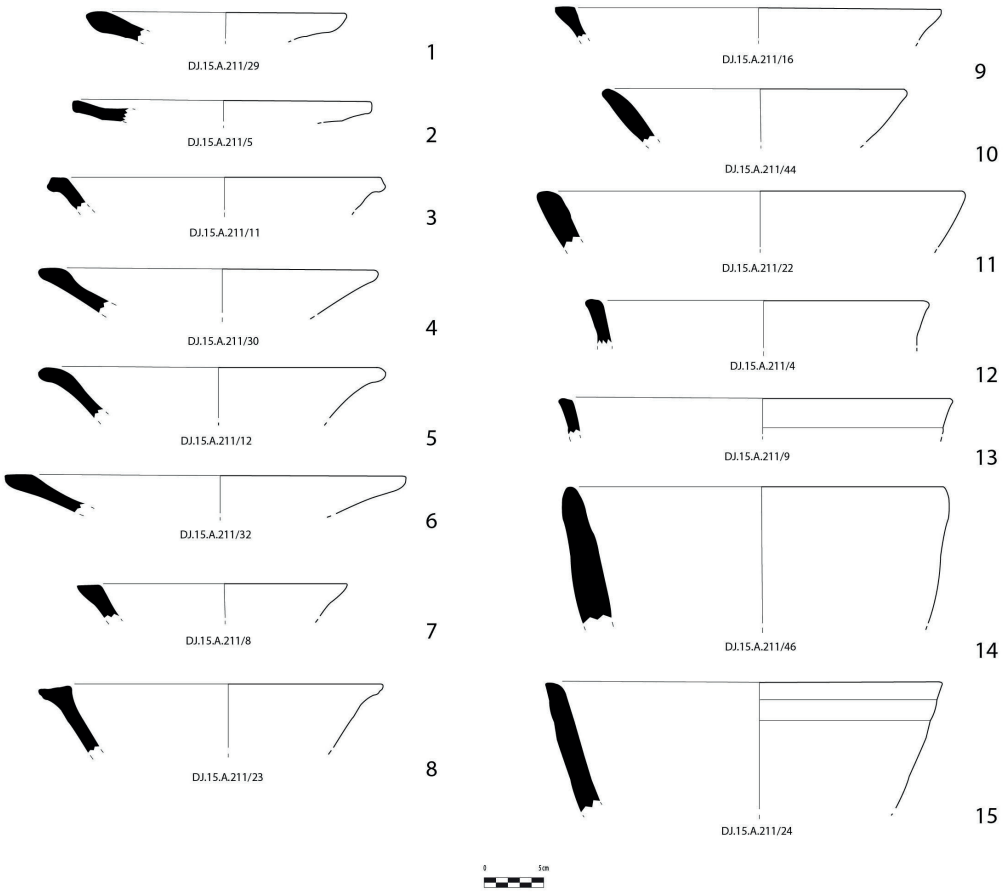


Fig. 16. Class IV.A. Local common bowls from level 4 in trench 8

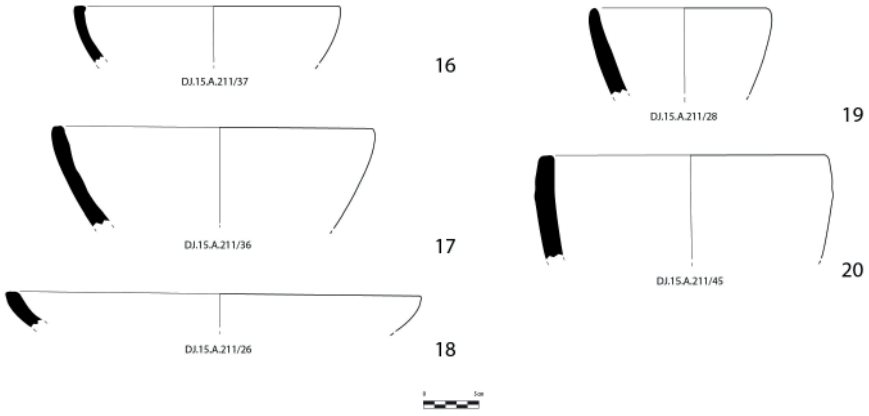


Fig. 17. Class IV.A. Local common bowls from level 4 in trench 8

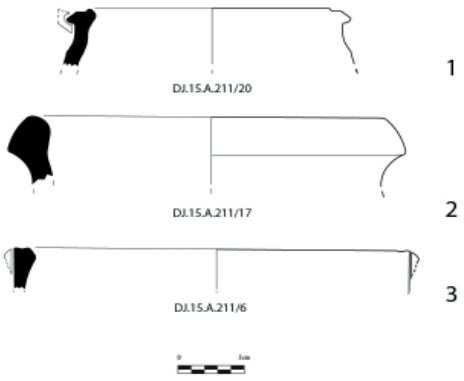


Fig. 18. Class IV.C. Local common jars from level 4 in trench 8

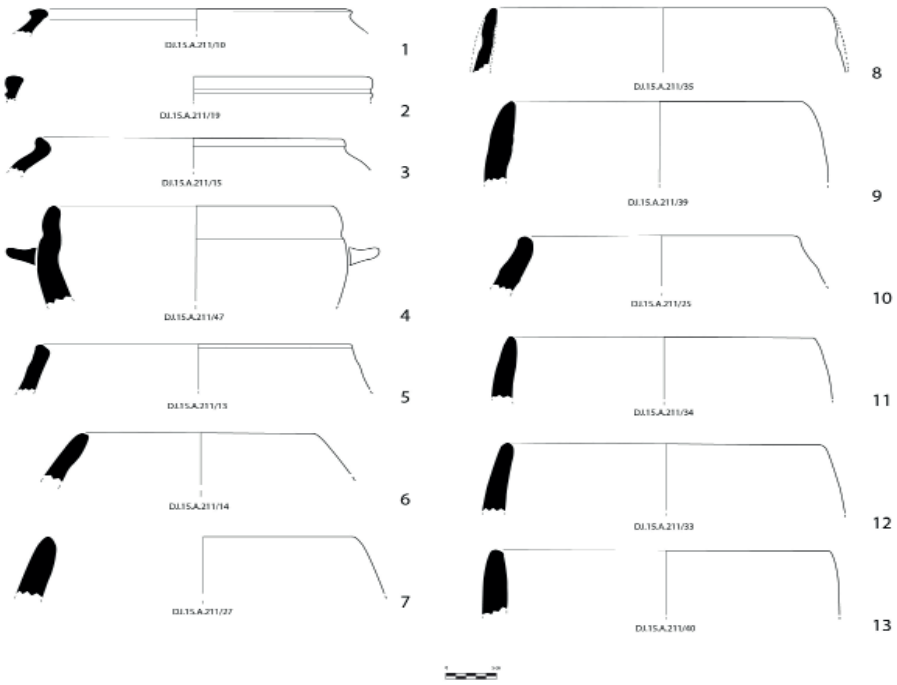


Fig. 19. Class IV.C. Local common ovoid jars from level 4 in trench 8

Fig. 20. A lid fragment from level 4 in trench 8

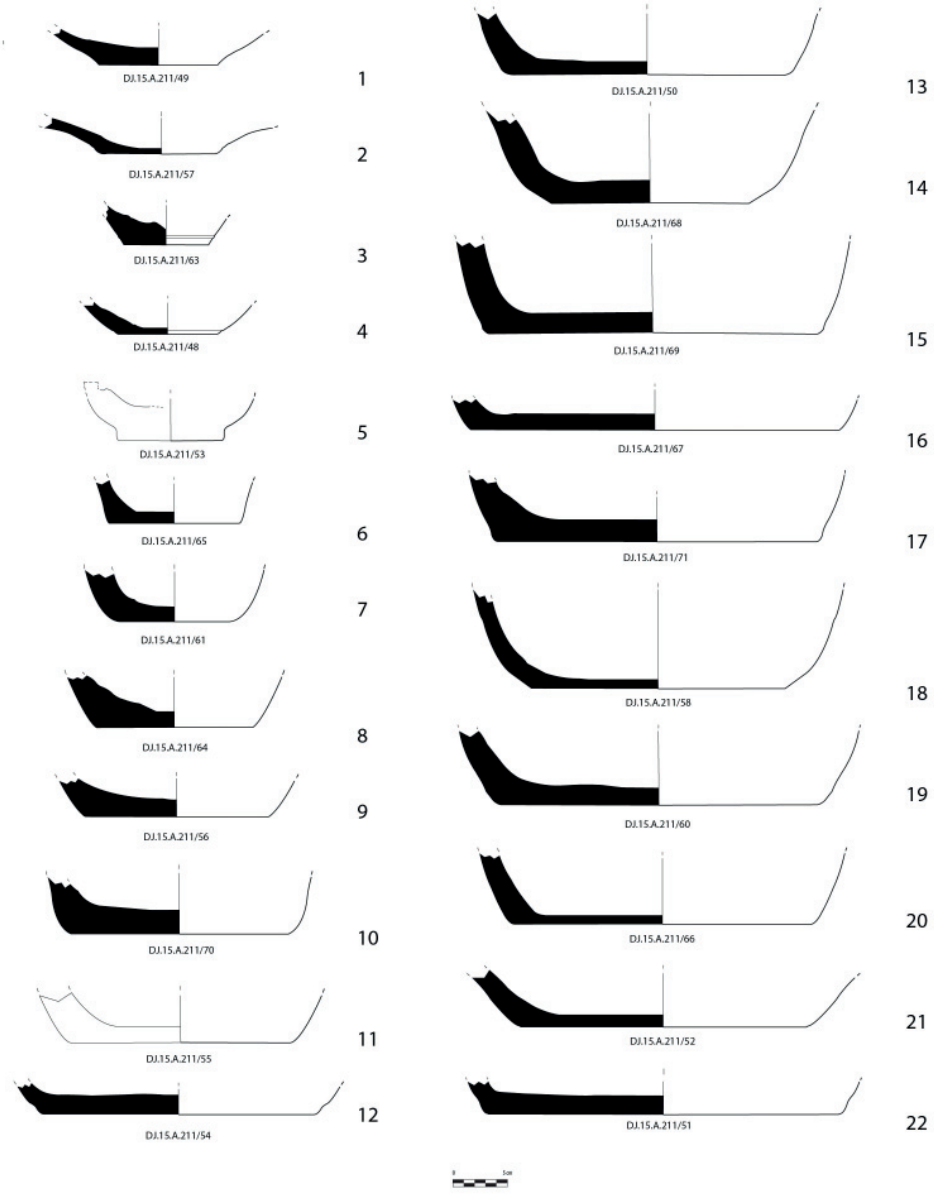


Fig. 21. Bases from level 4 in trench 8

Level 7

Bowls in **Fig. 22.1-2** are Type II.A.1, carinated low wall bowls. The jar in **Fig. 23** is Type III.C, fine and decorated local globular jar. Bowls in **Fig. 24**.1-6 are Type IV.A.1, tronconical bowls (see also **Fig. 11**, restoration of DJ.15.A.213/1 in **Fig. 24.1** and DJ.15.A.213/6 in **Fig. 28.2**); bowls in **Fig. 25.7-9** are Type IV.A.2, convex profile bowls; bowls in **Fig. 26.10-11** are Type IV.A.3, local common carinated bowls, whilst **Fig. 26.12** is a Type IV.A.4 vertical to oblique deep wall bowl. The jar in **Fig. 27** is IV.C.5, ovoid jar. The bases follow. Among the bases one recognises at least a preliminary difference between small bases related to consumption activities and large bases probably related to storage.

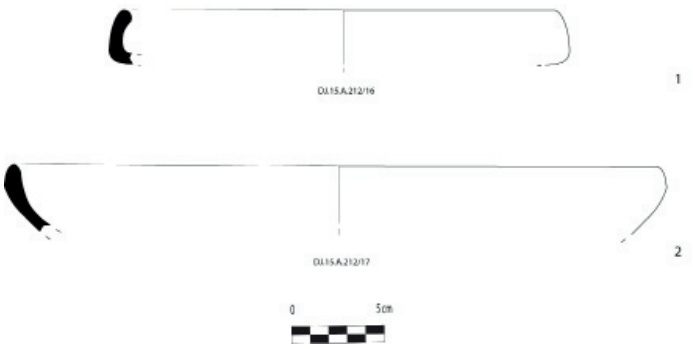


Fig. 22. Class II.A. Local fine bowls from level 7 in trench 8

Fig. 23. Class III.C. Local decorated ware from level 7 in trench 8

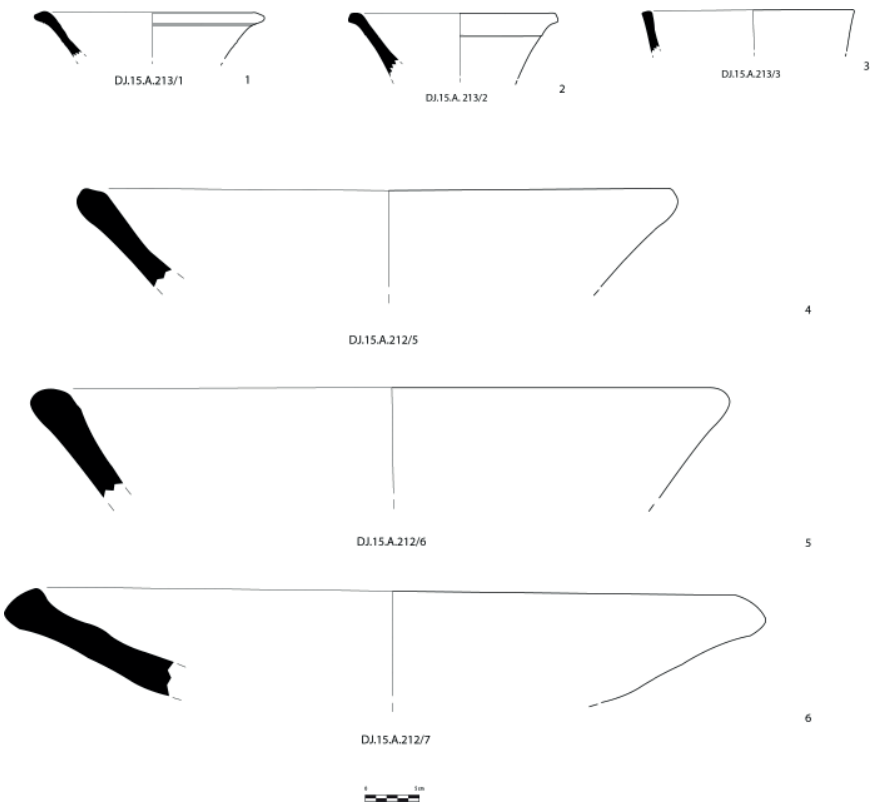


Fig. 24. Class IV.A. Local common bowls from level 7 in trench 8

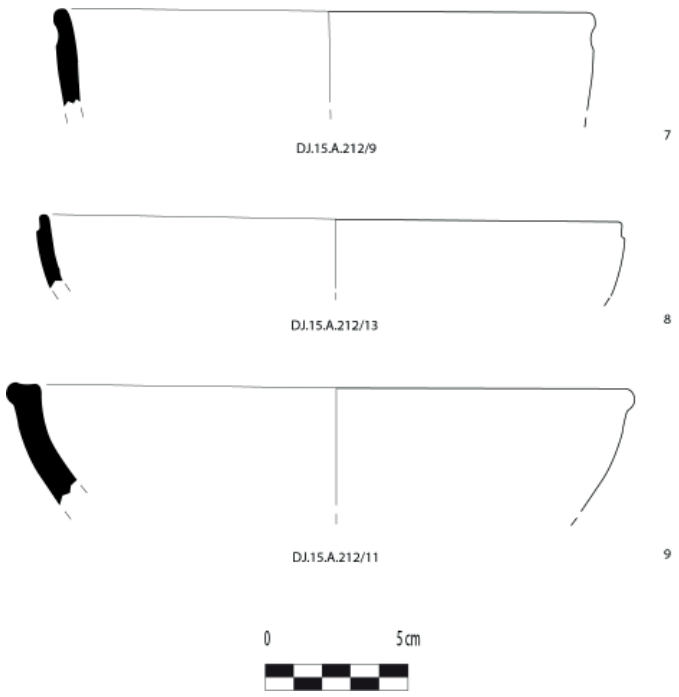


Fig. 25. Class IV.A. Local common bowls from level 7 in trench 8

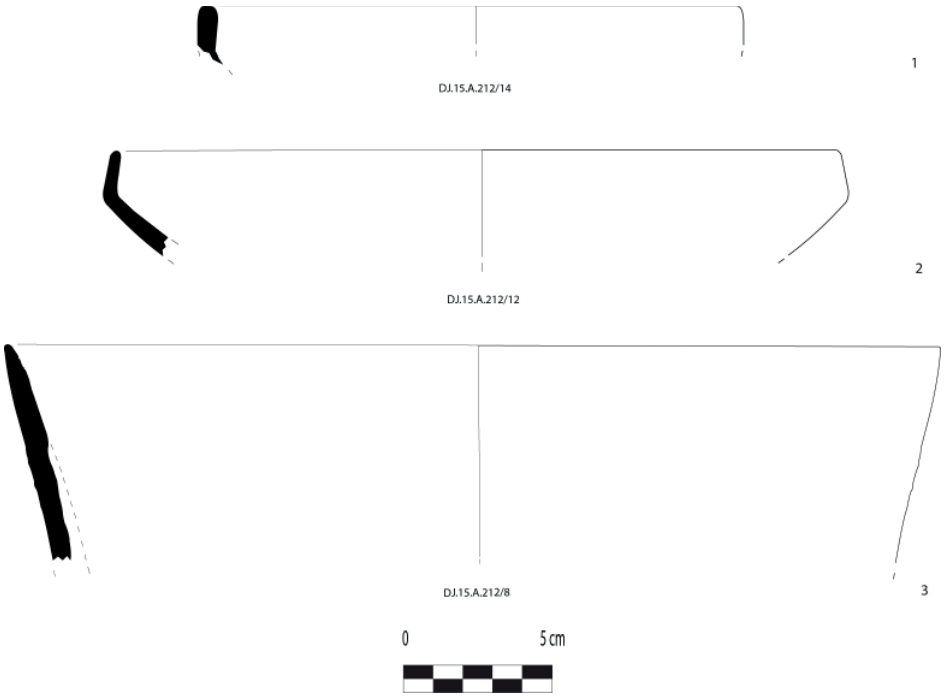


Fig. 26. Class IV.A. Local common bowls from level 7 in trench 8

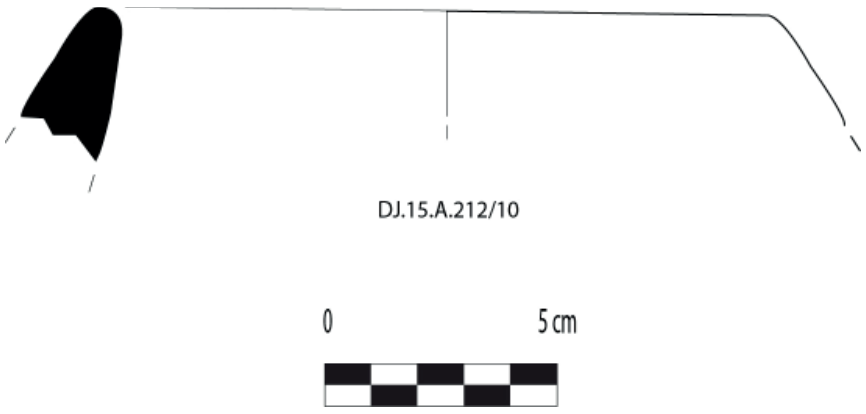


Fig. 27. Class IV.A. Local common ovoid jar from level 7 in trench 8

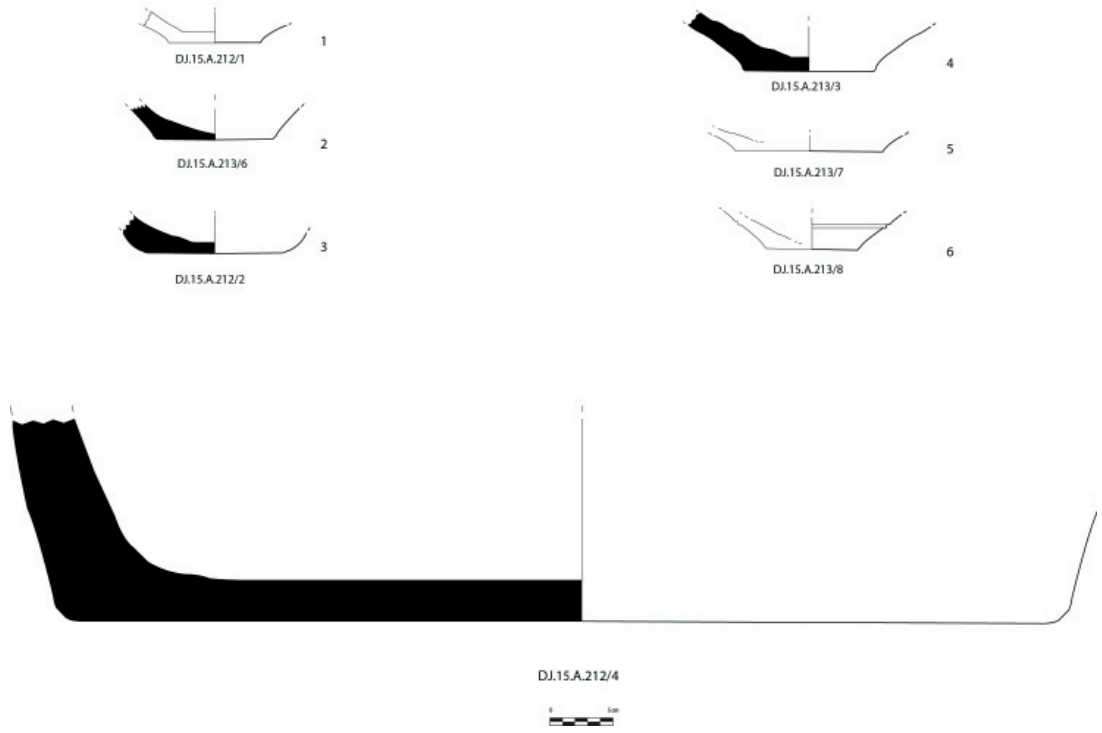


Fig. 28. Bases from level 7 in trench 8

Trench 9

Level 2

The bowl in **Fig. 29** is the first clear occurrence of a pre-Nabataean phase, in particular the Assyrian one. In light of the 2016-2019 excavation outside the western flank of the ʿUmar mosque, it is now properly defined a *corpus* of Assyrian ware to which this item pertains to.[11] The bowl in **Fig. 30.1** is Type II.A.1 carinated bowl; bowls in **Fig. 30.2-3** are respectively Type IV.A.1, tronconical bowl and Type IV.A.2, convex profile bowl.

The large jar in **Fig. 31.1** is IV.C.6 narrow neck jars; jars in **Fig. 31.2-4** are IV.C.2 hole-mouthed jars; jars in **Fig. 31.5-7** are IV.C.3 jars with short neck; the jar in **Fig. 31.8** is a IV.C.4 high neck jar.

Jars in **Fig. 32.1-2** are IV.C.5 ovoid jars with a thickened rim; the jar in **Fig. 32.3** is IV.C.7 globular jar; jars in **Fig. 32.4-5** are IV.C.5 ovoid jars with thin walls.

11. Loreto 2021.

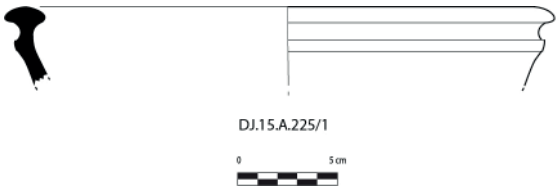


Fig. 29. Neo-Assyrian tradition ware

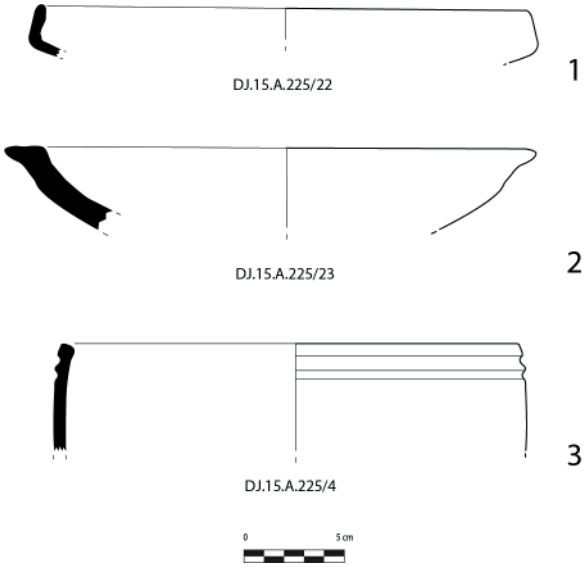


Fig. 30. Class II.A. Local fine bowl (1) and common bowls (2-3) from level 2 in trench 9

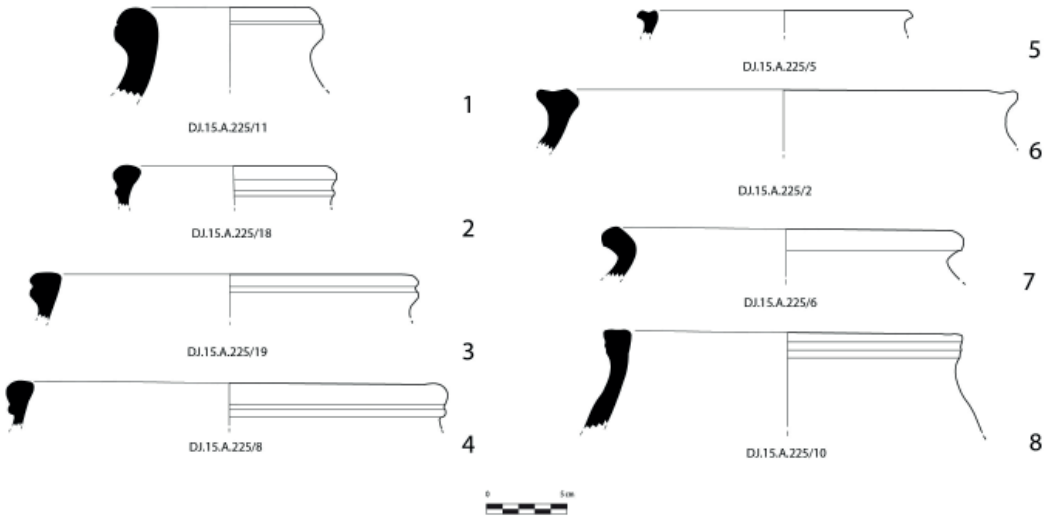


Fig. 31. Class IV.C. Local common jars

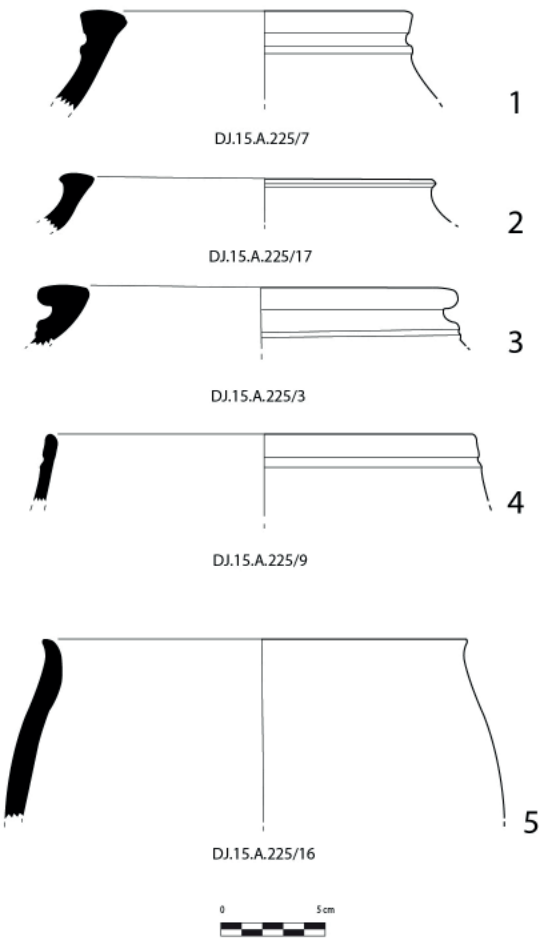


Fig. 32. Class IV.C 5, 7. Local common ware

Level 4

Very few fragments come from this stratigraphic unit. The bowl in **Fig. 33.1** is II.A. carinated bowls; the bowl in **Fig. 33.2** is IV.A.2 convex profile bowls with a thickened rim; jar in **Fig. 33.3** is III.B. ovoid jars decorated by impressed (by roulette or nail) motive under the rim.

Level 5

From the floor level of the Nabataean building discovered in trench 9 also few pottery fragments emerged. In particular, bowls in **Fig. 34**.1-2 are IV.A.1 tronconical bowls; bowls in **Fig. 34.3-4** are IV.A.4 vertical to oblique deep wall bowl; bowl in **Fig. 34.5** is IV.A.2 convex profile bowls with an everted and rounded rim.

Finally, jars in **Fig. 35**.1-2 are IV.C.5 ovoid jars and the pot in **Fig. 35.3** is a IV.A.5 large basin.

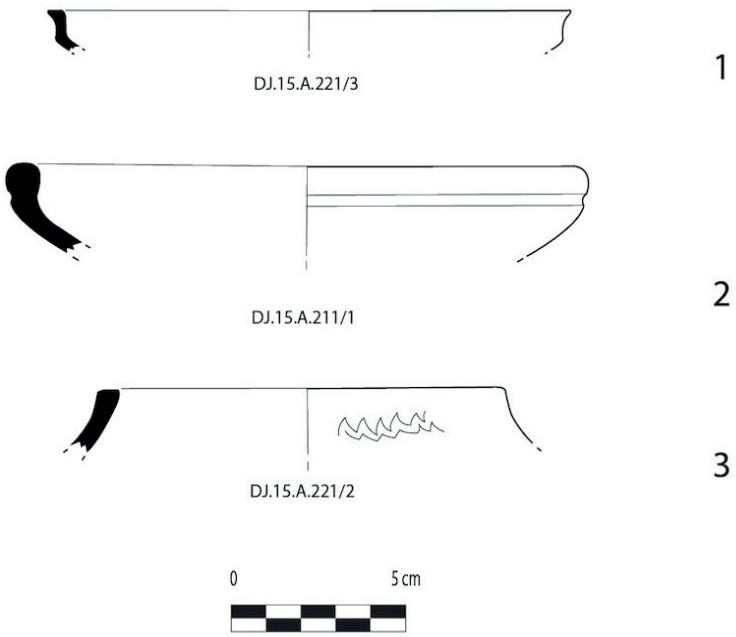


Fig. 33. Class II.A, IV.A and III.B

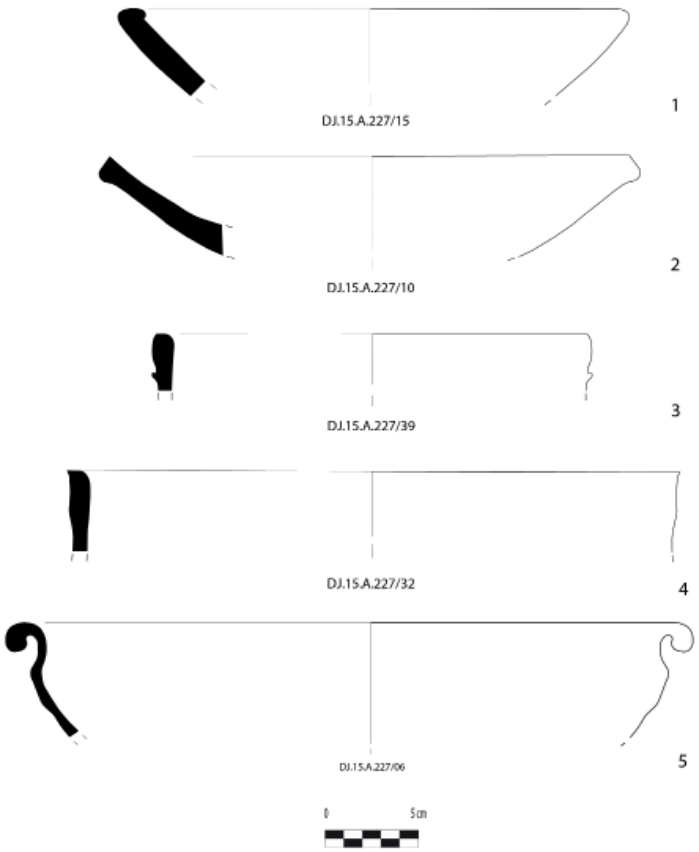


Fig. 34. Class IV.A. Local common ware

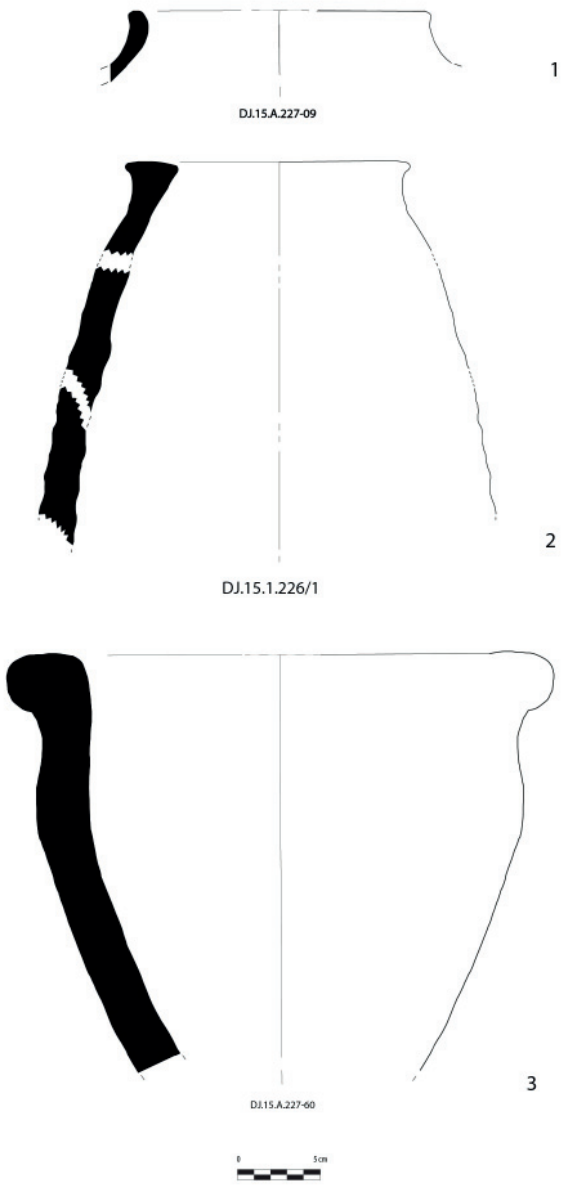


Fig. 35. Class IV. Common local ware

Dûmat al-Jandal from the advent of Islam

The pottery from Sector A, Trench 1

Simona Berardino [1]

Dûmat al-Jandal and its historical context at the time of Islam. A preliminary assessment

With the 2015 season, the beginning of a detailed study of the Islamic pottery from the Sector A area was carried out in order to provide a first glimpse on the material culture related to the long lasting ancient Islamic occupational sequence of the site, from the time of ʿUkaîdir b. ʿAbd al-Malik al-Kindî and the gazwa against Dûmat al-Jandal up to the 20th cent., when the last occupation of the historical core of ad-Dira' took place.

The main historical events related to the Islamic era were introduced in DÛMA I,[2] therefore the following is a detailed historical sketch of the main and most exhaustive sources related to the role of Dûmat al-Jandal from the advent of Islam and the socio-economic panorama of the Arabian Peninsula. On this regard, our main objective is to form a classification of the material culture from the excavation in the historical core of the oasis (starting from the pottery, and including the whole corpora of evidence) in order to provide a first material data of daily life in those centuries during which Dûmat al-Jandal, until then a major trade hub, became a marginal peripheral oasis.

During Late Antiquity, the Christian king ʿUkaîdir b. ʿAbd al-Malik al-Kindî is the most quoted character in the oasis, known for opposing the advance of the troops of Prophet Muḥammad (PBUH) and for his management of the annual market of Dûmat al-Jandal.[3] He belongs to a tribe that appears to control the oasis after the longest domination of the Kalb.[4]

1. University of Naples *L'Orientale.*
2. Charloux, Loreto 2014a: 50-54.
3. Loreto 2017: 203.
4. Al-Sudairî 1995: 36.

The precious as well as frugal sources pertinent to the arrival of Islam are all subsequent to the recounted events, therefore none of the relevant authors listed in this overview (among others: al-Wâqidi and his disciple Ibn Saʿd;[5] ibn Hišâm,[6] Ṭabarî,[7] al-Mâsʿwdî,[8] al-Ġazâlî) [9] was a direct witness of the vicissitudes described.

The literature refers to three battles fought for the conquest of the oasis. The first takes place in 626. The texts are ambiguous and discordant, but it is clear that the military campaign is preventive: the goal to avoid leaving the oasis in Christian-Byzantine hands using the pretext of the safety of caravans, often subject to raids, as well as to protect the city of Medina, against which an attack was presumably being organized. The inhabitants of Dûmat al-Jandal, warned in time of the enemy arrival, manage to escape avoiding the clash. Regarding this episode, Ibn Saʿd, Ṭabarî, and al-Ġazâlî are pronounced. The first writes:

Then (occurred) the ghazwah of the Apostle of Allah, to ***Dûmat al-Jandal*** *in Rabi al-Awwal, after the commencement of the forty-ninth month from his Hijrah. They (narrators) said: (The news) reached the Apostle of Allah, that a large number of men assembled at* ***Dûmat al-Jandal*** *and that they treated cruelly the camel-riders when they passed by them, and intended to attack al-Madinah. It (****Dûmat al-Jandal****) lies on the border of Syria at five days journey from Damascus and fifteen to sixteen days journey from al-Madinah. The Apostle of Allah, called the people and appointed Siba' Ibn 'Urfutah al-Ghifari as his vicegerent at al-Madinah and set out on 25 Rabî al-Awwal with one thousand Muslims. He travelled during nights concealing himself in the days. He had for his guide a person of Banû 'Udhrah who was known as Madhkur. When he reached there, they were evacuating their habitations, but there were the traces of goats and sheep.* […] *The news reached the inhabitants of* ***Dûmah*** *who dispersed. The Apostle of Allah, alighted in the plain and found none. He stayed there for several days and sent expeditions which returned without having come across any one* (Ghazanfar, Haq 1972: 76).

Ṭabarî instead reports the following:

According to al Wâqidî: in this year he mounted an expedition against ***Dûmat al-Jandal*** *in the mont of* ***Rabî I.*** *The reason for it was that the word reached the Messenger of God that a host had assembled there and had approached his territories; so, the Messenger of God mounted an*

5. al-Wâqidi (d. 823), Arab historian, in his Kitâb al-Maġâzî "The Book of Conquests", provides chronological information about the beginnings of the Caliphate. Other lost works have come down to us thanks to the work of his disciple Ibn Saʿd (d. 845), author of the Kitâb al-ṭabaqât kabîr "The great book of classes", in which geographic, chronological and genealogical information of the authors of hadith is collected.

6. Ibn Hišâm (d. 833) is remembered for his famous work Al-sîrat al-nabawiyyat "The Biography of the Prophet", one of the most relevant compositions inherent to the life and deeds of Muḥammad (PBUH), reworked from the work of Ibn ʿIšâq (d. 767).

7. Ṭabarî (d. 923), founder of the Koranic exegesis, in his monumental historical work Târîḫ al-rusul wa-l-mulwq "The History of Kings and Nations", mentions the oasis in ten volumes; in two of them an entire paragraph is devoted to Dûmat al-Jandal.

8. The historian al-Mâsʿwdî (d. 956) is known for his work Kitâb Murwǧ al-Dhahab wa-Ma'âdin al-Jawhar, known as "The golden grasslands". It is a wide-ranging geographical and historical work that deals with the first Caliphal dynasties, quoting Dûmat al-Jandal for both historical and geographical aspects.

9. Al-Ġazâlî (d. 1111), a key figure for the understanding of the philosophy and theology of his time, also founds his religious interpretation on the theological reinterpretation of important historical episodes, including the attacks by Islamic troops on the oasis by Dûmat al-Jandal.

expedition against them and reached ***Dûmat al-Jandal****, but he had no clash with enemy* (Fishbein 1997: 4).

Al-Ġazâlî confirms and amplifies what his predecessors wrote, tendentiously defining the inhabitants of Dûmat al-Jandal as arrogant and ready for continuous attacks.

628 is the year of the second attack: about 700 men are sent to the oasis in order to convert its inhabitants. The troops, although failing in their intent, impose the ğizîa.

Ibn Hišâm reports the following in this regard:

The Prophet (pbhu) dispatched Khalid ibnul-Walis to Ukhaidir at ***Dûmah****. Ukaydur ibn 'Abdel-Malik of Kindah was the king of* ***Dûmah*** *and he was a Christian. The prophet (pbuh) told Khalid that he would find him hunting cows. Thus, Khalid set out until he was within sight of his fortress.* […] *the cows were rubbing their horns against the castle gate. His wife urged him to go after the cows.* […] *During their ride the cavalry of the prophet (pbuh) attacked them, captured the king and killed his brother. Ukhaidir was dressed in a brocade gown covered with gold. Khalid took the gown away from him and sent it to the Prophet.* […]*. Ibn Ukhaidir Ishaq said that Khalid brought Ukaydur to the Prophet (pbuh) who spared his life and reconciled him on condition that he paid the tribute. Then he set him free and he returned to his town* (Harûn 2000: 246, 247).

Ṭabarî writes:

Then a messenger of God summoned Khâlîd b. al-Walîd and sent him to Ukhaidir at ***Dûmah****. This was Ukhaidir b. 'Abd al-Malik, a man from Kindah who was king of* ***Dûmah*** *and a Christian. The Messenger of God told Khalid that he would find him hunting wild cows. Khâlid b. al-Walîd rode out until he come within sight of his fort. It was a moonlit summer night and Ukhaidir was on the roof terrace with his wife. The wild cows had been scratching the palace gate with their horns all night,* […] *He then came down and called for his horse which was saddled* […]*. On their way they encountered the Messenger of God's cavalry and Ukhaidir was seized and his brother Hassan was Killed. Hassan was wearing a silk brocade gown woven with gold in the form of date-palm leaves.* […] *Khalid brought Ukhaidir to the Messanger of God, who spared his blood and made peace with him on the condition that he paid the pool tax. Then he released him and return to his village* (Poonawala 1990: 58, 59).

The last expedition took place in 630, when the troops of the nascent Caliphate arrived at the oasis with a contingent of 420 men. ʿUkaîdir comes to terms, but shortly after violates the treaty. The sources, although they agree on the final outcome of the battle, do not agree on the fate of ʿUkaîdir.

Ṭabarî also recalls a fourth military campaign, absent in other sources, dated to 633, when the first of the four well-guided caliphs was at the head of the *umma*.

When the people of ***Dûmah*** *heard that Khalid was marching against them, they sent [messages] to their allies among Bahra', the Kalb, the Ghassan, the Tanukh, and the Daja'im.* […]. *The two leaders, Ukhaidir b. 'Abd al-Malik and al-Judi b. Rabi'ah disagreed [about what to do]. Ukhaidir said," I am the most knowledgeable of people about Khalid. No one is better omened than he, or sharper in war.* […]. *I will never conspire with you to make war on Khalid. It is your affair.". Then he went on his way. That [word] reached Khalid, who sent out Asim b. Amir to stop Ukhaidir. 'Âṣim captured Ukhaidir, who said, "I have no met other than the amîrKhâlid." When he was brought to Khâlid, the latter had him beheaded and took the property that had been with him. Khâlid then went along until he besieged the people of* ***Dûmah*** […]. *Khalid put* ***Dûmah*** *between his own troops and the troops of 'Iyâḍ. The Christian Arabs who lead reinforced the people of Dûmah surrounded the fortress of* ***Dûmah****, for the fortress could not hold them.* […] *when the fortress was full, those inside shut the fortress against their comrades, who remained around it, cut off. 'Asim b.'Ams said "O Banû Tamîm, the Kalb are your confederates. Be charitable to them and offer protection to them, for you cannot do [anything else] like it for them". They did [as he said]* […]. *Khalid came against those who had retreated towars the fortress and slew them until he blocked the gate of the fortress with them.* […] *Khalid remained at* ***Dûmah*** *but sent al-Aqra' back to al-Anbâr* (Blankinship 1993: 57-60).

He sent Khâlid b. Walîd from Tabûk to ***Dûmat al-Jandal*** *and conquered it by force. He took its king Ukhaidir b. 'Abd al-Malik captive. He invited him to receive protection and pay the poll tax, after his land had been conquered by force and he himself had been taken prisoner* (Friedmann 1992: 157).

As the author himself reports, the oasis remains a refuge for those who oppose the Islamic advance.

So, when Usamah found himself in the midst of the Quda'ah country, he deployed the cavalry among them and ordered them to make those who had stood firmly by Islam rise up against those who had turned back from it, so that they fled until they took refuge in ***Dûmah*** *and gathered round Wadi'ah. Usamah's cavalry returned to him, whereupon he decamped with them until he raided al-Hamgatayn, striking among the Banu al-Dubayb of Judham and among the BanuKhaylil of Lakhm and their party of the two factions."* (Donner 1993, p. 44). *(Abu Bakr) had dispatched `Ikrimah to `Uman and then to Mahrah, and he had ordered Shurahbil to remain where he was until Abu Bakr's order should reach him, then [to go to]* ***Dûmah*** *to raid the apostates of Quda`ah with 'Amr b. al As* (Donner 1993: 139).

Following these events, Dûmat al-Jandal, therefore remains in the shadows, with the exception of some scant reference to the hegemonic tribe of Banû Kalb.

Choose the area you most prefer" he then said, and I'll take you there, "Syria", they replied. So, with 400 riders from Taym al-Ribab he escorted them until they had entered well into Kalb territory at ***Dûmah*** (Brockett 1997: 160).

When the Umayyads move the capital of the empire to Damascus, the Arabian Peninsula is on the way to a gradual decline, relegated to the margins of the great imperial courts: the great Arabian commercial oases are reduced to a regional and no longer trans-Arabian trade circuit on a large scale. The only exception, perhaps, is the Ḥiğâz, which arouses the interest of the courts since there were Mecca and Medina, pilgrimage destinations or, in the case of Medina, a prestigious law school. On the other hand, during these years Dûmat al-Jandal is still a well-known center. There is a reference to the year 658, when the arbitration of the first Fitna, that is the first split of the young Islamic world into two factions, took place in Dûmat al-Jandal.[10] This negotiation, which failed in any case, saw the representative of ʿAlî and that of Mu'âwiya b. Abî Sufyân, first exponent of the Umayyad Dynasty in opposition.[11] According to what was reported by Ṭabarî , the oasis still had to be a center of a certain political prestige as well as a settlement of considerable size, given the possibility of hosting at least 800 men.

The man of Iraq choose Abû Mûsa al-Ash'arî and those of Syria 'Amr b. al-'Âṣ. When the two had been appointed the men at Siffin dispersed, and the two arbitrators stipulated that they should elevate what the Qur'an elevates and put down what the Qur'an puts down, that they should make a choice for the community of Muhammad, and that they would meet together at ***Dûmat al-Jandal*** *or, if they did not meet for that, they should meet the next year at Adhruh* […] *They had separated from Ṣiffin having stipulated that the two arbitrators should come with 400 men each to* ***Dûmat al-Jandal****. [and Mu'âwiya sent 'Amr b. al-'Âṣ with 400 of the Syrians. They came to* ***Dûmat al-Jandal*** *at Adhrûh]* (Hawting 1996: 90, 103, 104).

Also, according to what was reported by the Persian historian, Dûmat al-Jandal still hits the headlines during the Abbasid revolution since it is a supporter for Abû l-'Abbâsas-Saffâḥ, first caliph of the new dynasty.

10. There are uncertainties regarding the actual conduct of the arbitration at the oasis. Hawting reports the following: Ar. tawafaw bi-Damat al-Jandal bi Adhrul. The Leiden editor's note indicates that we should understand something like "they came to Dumat al -Jandal or rather Adhruh" while the note in Add. at emend. suggests that a marginal comment might have found its way into the text. Some sources read min Dflmat al-Jandal bi-Adhrub, which Ann., &H. 38 §18, understands as "at Adhruh, coming from Damat at-Jandal." It is possible that the various formulas should be seen as attempts to reconcile contradictory traditions about the place of the arbitration meeting (Hawting 1996: 104, note 424).

11. See Lo Jacono 2003: 77-84.

It is mentioned that when Dawud b. ʻAli and his son Musa were in Iraq, or somewhere else, they had left wishing to reach Sharat. Abu al-ʼAbbas met them at ***Dûmat al-Jandal*** *while on his way to Kufah. With him were his brother Abu al -Jaʼfar ʻAbdallah b. Muhammad, ʻAbdallah b. ʻAli, ʻIsa b. Musa, and Yahya b. Jaʼfar b. Tammam b. al-ʼAbbas and a party of their mawlas. Dawud asked them, "Where are you going, and what is your story?" Abu al-ʼAbbas told him their story, and said that they were heading for Kufah to make their appearance there and openly proclaim their authority* (Williams 1985: 157-158)

The Arabia that emerges after unification reveals itself to be a place of various and complex articulations. In fact, it never constitutes a unitary province of the empire, on the contrary it sees a continuous succession of political and administrative changes. Each region, in turn, cyclically experiences unity and fragmentation under dynasts that fail to consolidate a unitary state.

It is known that the Peninsula, and especially the Ḥiğâz, continues to thrive during the first phase of the Abbasid Caliphate, through an active and direct participation in both maritime and land trade and exploiting the pilgrimage routes.[12] In this context, the loss of relevance of Dûmat al-Jandal would be linked, instead, to the preferential use of the Ḍarb Zubaydah,[13] which with its 57 stopping stations would have excluded Dûmat al-Jandal from pilgrimage routes and trades. From this moment on, the economic role of Dûmat al-Jandal diminished dramatically, until the oasis was reduced to a series of small villages with no economic power or strategic importance.

Among silent sources, the only text available is the work of the geographer of Hama Yâqût (d. 1229) who in the Kitâb mu'jam al-buldân "The dictionary book of nations", quotes Dûmat al -Jandal. The historical events he describes, however, are pertinent to the legendary founding of the city and the conquest by the Caliphal troops. Although it is possible that he reached the oasis after his release during one of his travels, the episodes he narrated are all extracts from other authors, including Ibn Sa'd. In 1773 the oasis became part of the first Saudi state and in 1823 in the second. This unification was then followed by big turmoil and the power that is affirmed is that of the Rašîdi, who perform the function of local governors whose capital is Hâʾil. The first is ʿAbd Allâh ibn Rašîd, named by Faîṣal bin Turkî al Saʿud.

The oasis had already been within the sphere of influence of the Rashidis as its population recognized their authority by paying a tribute. As soon as internal disputes among the inhabitants of ***al Jauf*** *broke out,* […] *other oasis such as* ***al Jauf*** *trade, tribute from the nomadic and sedentary population and subsidies from central governments (mainly the Ottoman Empire)* […] *Ibn Rashid sent his brother Obeid with 3000 camel refers against the disunited oasis which later became tributary to him. Both Eallin and Musil claim that Ibn Rashid did not immediately appoint a governor in the oasis as each quarter had its own sheik. These dealt with the internal affairs to the amîr in Hail. Tribute from* ***al Jauf*** *was collected by five men appointed by the amîr from among the population of* ***al Jauf*** (Al-Rasheed 1997: 122, 151).

12. See Nicosia 2013: 115.
13. al-Rashid 1980, 2010a.

Numerous European travelers have come to the oasis since the eighteenth century and have left testimony of their experience.[14] The Englishman Charles M. Doughty is, in the opinion of the writer, the one who left one of the most detailed accounts, telling of a society perhaps not too different from that of a few centuries earlier, making the reader aware of data ranging from the daily life of the oasis, to the politics of the Rašîdi, up to major events. Here are some passages from his writings:

There is a petty industry among women of sewing and embroidering, with silk and metal thread, the mantels which are brought down (in the piece) from Jauf and Bagdad (Doughty 1921: 6).

What is the state and the authority for which these bitter Arabians contended? Ibn Rashîd us nasterm as I can understand of some thirty oases, of which there are five good desert towns: Sh'kaky, ***Jauf****, Hâlil, Gofar, Teyma, with a population together of 12,000 to 13,000 souls: others are good villages* […]. *The ordinary government expenses, for castle service, for the maintenance of the armed band, the slace grooms of his stud and the herdsmen of his live wealth in the wilderness, stewards, mutasallims, his residents in outlying towns as Teyma and* ***Jauf****, the public hospitality at Hayl, and for the change of clothing, may be nearly £12,000.* […] (Doughty 1921: 19, 20).

I have known certainly Damascene salesmen to the Beduw, that had visited Hayil and one of them was a Christian, who traded every year to the W. Sirhanal ***Jauf*** *[…]. Among the strangers, in any time, in Hayil, that lived of Ibn Rashid's wages, were certain Moghrebies. These Moors were at the taking of* ***Jauf****, in expedition from Syria. Unto them, at the departure of the Pasha, was committed one of the two towers, Mârid; and the other to a few Syrian soldiery* (Doughty 1921: 32, 33).

Many poor Jaufies come every year into the Hauran seeking labor, and are hired by the Druses to cleanse and repair their pools of rain-water: it is the jealous manner of the Druses, who would live by themselves, to inhabit where there is scarcity of water. Much salt also of the ***Jauf*** *deserts is continually carried thither. The* ***Jauf*** *villagers say that they are descended from Mesopotamians, Syrians and from the Nejd Arabians* (Doughty 1921: 49).

In the Arabs of the desert is a natural ability for beating out what shapes they would in stone. We have seen the Beduins fashion their best pipe-heads (aorfy) thus, and in like manner their stone coffee-pestles are wrought; they work also great beads of stone, and drill the ball with a nail for a club-stick head: some which I have seen were perfect globes of white marble, from the northern deserts "about ***Jauf****." - I saw such ganna heads formed by them of another matter, el- elk; and that is they say the juice of a low-growing shrub in the Nefud, el-motti: it may be a kind of caoutchouc* (Doughty 1921: 180).

The sunn's of ***al Jauf*** *are greatly esteemed in all N.W. Arabia and the land beyond Jordan, for their skill in metal and marble working (coffee, mortars and pestels).*

14. See Charloux, Loreto 2014: 52-54.

*There is a salt traffic from the neighbourhood of **al Jauf** to the Hauran, wither there come every year many poor **Jaufites** to labour for the Druses (Doughty 1921: 607).*

The only break if the Rašîdi dominion is the incursion of the Ottoman Turks, dated between 1872-1873. The Rašîdi fall definitively with the birth of the Saudi Third State in 1922,[15] and Dûmat al-Jandal herself is heading towards a new prosperity.

The pottery from Sector A, Trench 1. 2015 season

Introduction

As part of the sixth excavation campaign at the Dûmat al-Jandal site carried out by the Saudi-Italian-French joint-project, a first systematic study of ceramic pottery from the Islamic era from the excavation of Trench 1-Sector A was launched.

The short-term objective is to define a methodological approach suitable for the material, to homogenize the new data with those previously recorded [16] in order to make them easily usable, and to carry out an initial systematization of the data for a preliminary feasibility study in planning the continuation of the work in future years. The long-term objectives are many, first of all the creation of a chrono-typological catalog of the Islamic ceramic material, complete with mineralogical, technological information and short and wide-ranging comparisons, paying particular attention to the ancient Islamic period, whose knowledge is incomplete, and to the first centuries of the caliphate, that is when the site still maintains its strategic importance. This catalog will contribute to the creation of a relative and absolute chronology; to the understanding of the function of the investigated structures; the reconstruction of the socio-economic context of the ancient inhabitants, as well as knowledge of the relationships between the site and the surrounding areas. It will also be the first reference grid for common Islamic North Arabian pottery from a stratigraphic context in a seamlessly occupied site.

The challenges to be faced are many. First of all, the very nature of the material: common ceramic is itself conservative as it is linked to a practical and not aesthetic need, often small in size due to the continuous reoccupation of the site. Added to this is the shortage of historical sources, which are not very informative for aspects related to daily life. A further stimulus is the recognition of any production centers of the ceramic material here introduced. Based on the autoptic characteristics, it seems clear that a large part of the pottery is linked to a local or subregional production.

15. See al-Simari 2010.
16. See Siméon 2014.

Neither furnaces have been identified (the latter fundamental in the study of production techniques) nor production waste. However, it is equally true that working in the heart of the oasis, that is the acropolis and the town, the absence of industrial traces is absolutely understandable. It is known that the absence of evidence is not evidence of absence, and the current working hypothesis is based on this line. However, the ethnographic approach and the search for artisans who locally produce ceramics gave a negative result, especially due to the urbanization that has characterized the area in recent years.

Finally, it should be noted that the analysis of the material began in the field and is still ongoing, under the authorization of the *Saudi Commission for Tourism & National Heritage* it was possible to move a selection of fragments for detailed archaeometric analysis in Italy.[17]

Methodology

The methodological approach was calibrated on the characteristics of the *corpus* in order to more easily manage the enormous mass of ceramic fragments recovered during the excavation. In light of the strong variability of features, classes and types are defined according to the following criteria:

- ceramic classes: all the fragments sharing the same fabric and the same surface treatment;
- ceramic types: all the fragments of the same class united by shapes, probably the result of production uniformity, perhaps regional if not of a peculiar workshop. They are therefore coherent groups with significant archaeological distribution, each referable to a single exemplary sample.

During the work, the accidental use-life (attrition, abrasions, chromatic alterations, etc.) and the post-depositional or post-excavation alterations (accretion, abrasions, etc.) were examined, in order to carry out a systematic analysis aimed at corroborating the working hypotheses regarding the use-life of the vessels. However, it should be noted that the hypotheses of function will be attributed only once a copious part of the *corpus* has been examined.

In order to maintain the highest degree of neutrality in the study, alphanumeric codes were attributed to fabric, shaping and morphology. The data is then merged into daily recurrence cards collected in a Microsoft Access database.

During the study of the shaping techniques, in addition to the modeling technique of the vessels, a focus was devoted to the traces of modeling, characteristics of the coatings, and other peculiarities such as the walls' thinnes (better conductors of heat) the absence of hulls or corners (associated with a specific thermal behavior), or specific treatments that reduce resistance to thermal shock.

17. The analysis still in progress are carried out in collaboration with the CNR of Montelibretti in the persons of Ombretta Tarquini; Marcello Colapietro; Augusto Pifferi and with the Department of Biology, Ecology and Earth Sciences of the University of Calabria in the person of Annamaria De Francesco, who are all thanked in here. I would like also to give my thank to Vincenzo Francaviglia for his general approach and his supervision to the analysis.

As far as morphology is concerned, the fragmentary nature of the material examined does not allow to attribute a precise shape to each fragment. Consequently, dimensional ratios are excluded, which are useful distinctive criteria that are currently unusable as they are applicable only to an insignificant part of the *corpus*.

THE POTTERY: preliminary remarks

Alongside the rearrangement of the drawings [18] and pictures, it was possible to study about 1200 ceramic fragments,[19] coming from the following archaeological levels:[20]

- level 2 (15th-18th cent.): surface layer of aeolian sand;
- level 3 (15th-18th cent.): collapse of earth and stones;
- level 3 in *Locus* 6 surface (15th-18th cent.): walking surface on collapsed earth and stones;
- level 3 in *Locus* 8 (15th-18th cent.): a surface on collapsed earth and stones;
- level 11 in *Locus* 9 - removal (7 th-8th cent.): removal of the collapse of Building A [21] in *Locus* 9;
- level 11 in *Locus* 9 (7 th-8th cent.): aeolian sand on the collapse of Building A in *Locus* 9;

In addition, it was possible to assist in the study of pre-Islamic materials from the following levels:

- level 5 (2nd cent.): life deposit outside Building A;

Regarding the pottery of this latter layer see Loreto & Cocozza in this volume.

As can be seen from the graph in **Fig. 1**, excluding the levels attributable to the pre-Islamic era, pottery is concentrated in level 3 which includes 49% of the archaeological material analysed in 2015. This collapse of earth and stones covers the entire excavation surface and the pottery was analysed according to the relevant loci. The layer with the fewest fragments appears to be level 2, which yielded about 2% of the archaeological material presented here. However, the latter estimate is misleading as it is a level only partially investigated.

Considering the ceramic fabrics, if we exclude fragments in a bad state of preservation or which are unrecognizable due to excessive contact with fire, it should be emphasized that there is an interesting balance in the *corpus* between the coarse and fine fabrics. The latter in fact are only 4.74% more than the former. As one can see in the graph in **Fig. 2**, the most attested fine fabric is number 1[22] which constitutes about 22% of the material in question. The coarse one with the highest attestation is 9, which includes 15% of the ceramic pottery analysed.

18. 650 designs of ceramic fragments have been recovered and reorganized, of which 365 are pertinent to vessel forms found in Islamic levels.

19. It should be noted that the materials relevant to the VI excavation campaign are presented here, however the ceramic study continued in the following years (2016-2019).

20. For the dates presented here, reference is made to Loreto 2014: 98.

21. For information on Building A, see Loreto 2014: 132-138.

22. For further information on the fabrics mentioned, see the sheets shown in the Appendix.

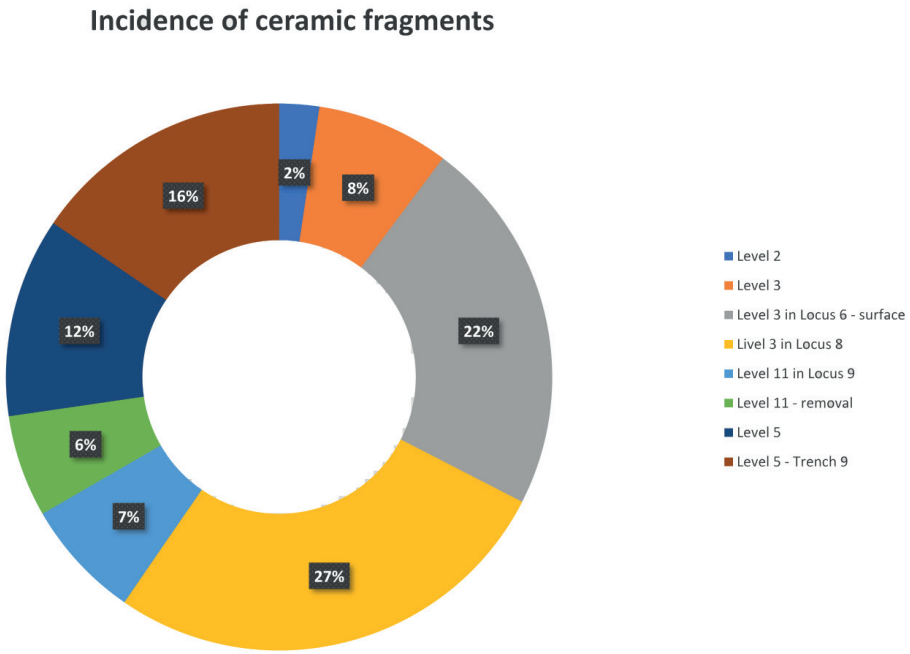


Fig. 1. Incidence of ceramic fragments in the different archaeological levels

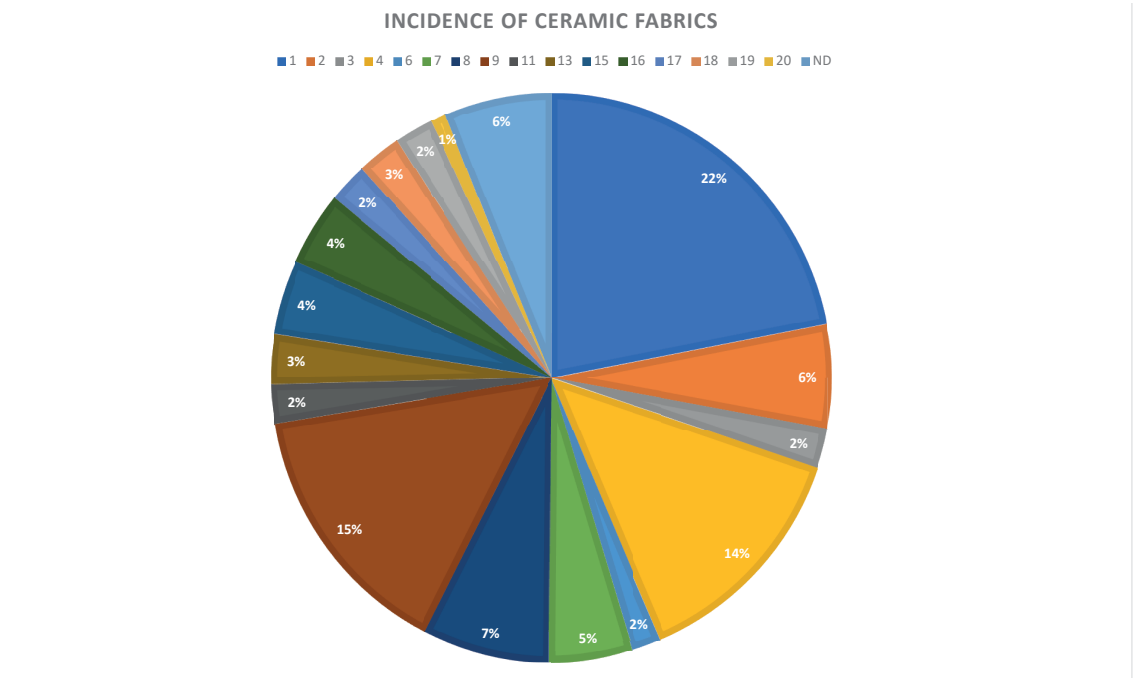


Fig. 2. Incidence of ceramic fabrics in the analyzed corpus

Some fabrics, such as 3, 4, 6, 19, are sporadically attested and can be considered at least in part as decontextualized intrusive material.

75.42% of the examined ceramics consisted of handmade vessels (pinching or coiling) or slow-wheel. The remainder was made on the fast-wheel. At the moment, no fragments of stamped vessels have emerged from the levels in question. Ceramic made by hand or on a slow wheel is mainly characterized by a polished surface (**Fig. 3**) or by a smoothed one (**Fig. 4**), frequent traces of direct contact with fire during its usage or post-lying (**Fig. 5**).

Fig. 3. Example of ceramic characterized by surface polishing from the level 3 in *Locus* 6

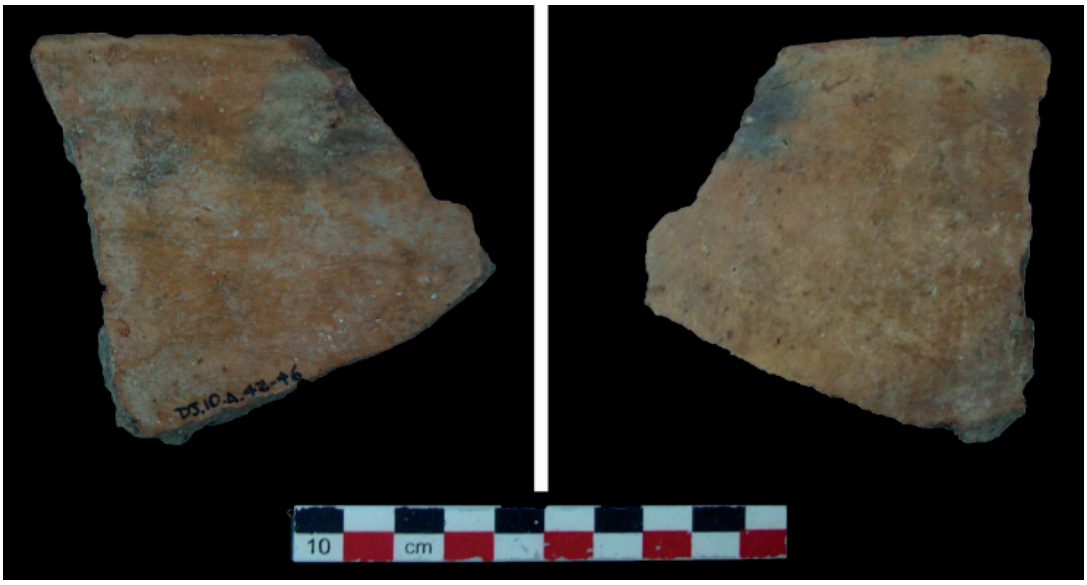


Fig. 4. Example of ceramic characterized by a smoothed surface from the level 3 in *Locus* 6

Fig. 5. Example of ceramic characterized by chromatic alteration, probably ascribable to fire contacts, from the Level 3 in *Locus* 8

The superficial lightening is quite attested (**Fig. 19: 1-6**), however it never concerns the entire vessel surface and is constantly associated with some fabrics, suggesting a conscious production; in other cases it is clearly accidental. The remaining part is made up of fragments covered with slip, mainly white;[23] red is also attested, (**Fig. 6**) sometimes with purple hues.

There are differences between the two types of coating used: the red is thin and more purified, the white instead is thicker, with good adhesion to the wall, grainy and with impurities. This feature of the white slip it is shared with the ceramic made on the wheel. Furthermore, the presence of clayey coating is attested on a couple of fragments to cover the surface lightening.

This gives the idea of an unwanted and / or not well controlled process. The remaining fragments, on the other hand, are characterized by bituminous coating (**Fig. 10: 5, 6; Fig. 16: 7-11; Fig. 21: 2-3**), through holes (**Fig. 20: 3**) and decorations. With regard to the latter aspect, the ceramic almost exclusively features painted decorative elements (**Fig. 10: 3-4, Fig. 14: 7, Fig. 16: 1-6**). These are often real paint stains made directly on the surface or on a preparatory clayey layer, arranged at an irregular distance without no apparent order.

The colors of the painted elements shift between red, brown and orange.

The surface treatments identified on the wheel-made fragments are more complex and articulated. Most of the tableware is characterized by the presence of polished surfaces and covered with white slip (**Fig. 7**), which frequently show blackening, a consequence of the post-laying phase of the vessel. Smoothing and engobe can be considered both aesthetic and functional treatments. In fact, in addition to homogenizing the walls, the surface is less porous and more impermeable.

23. Variations of the white color (white, ivory, pinky, light grey, beige, etc.) are not defined in this phase of work. According to the current hypothesis it is the same clayey coating, perhaps kaolinic, whose nuances and slight alterations are related to fire.

Fig. 6. Example of ceramic characterized by red clay coating from the Level 3 in *Locus* 8

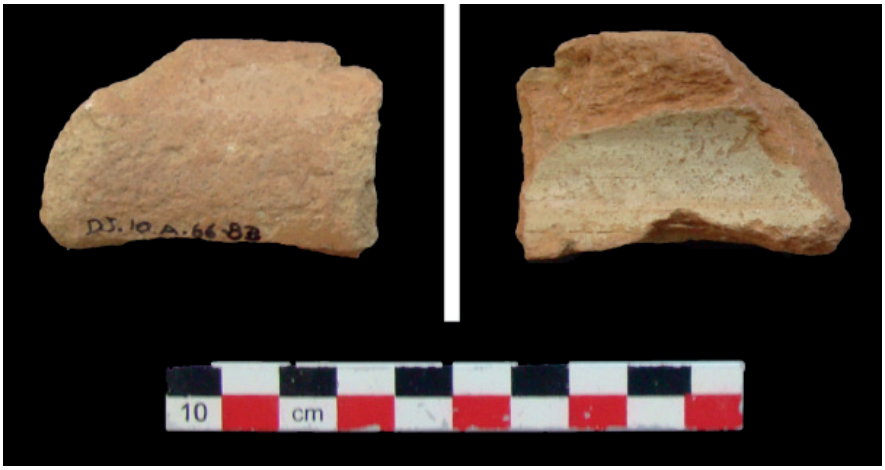


Fig. 7. Example of lathed ceramic externally coated with white engobe from level 3 in *Locus* 8

Sometimes the white engobe, which shares the characteristics of the coating found on handmade containers, has a color that tends to beige or yellowish. The red engobe is also frequent, also occasionally characterized by fire clouds. Less common is the double engobe, white and red. The vessels characterized by white clayey coating have various types of decoration whose motif cannot always be reconstructed in its entirety (**Fig. 11: 1; Fig. 15: 8, 9, 10; Fig. 21: 1**). Very few wheel-made fragments show traces of paint (**Fig. 11: 4**), unfortunately attested in minute fragments or only in traces.

As it can be seen, therefore, it is almost entirely unglazed ware. In fact, only 12 glaze coated fragments were identified. Specifically: two fragments of *Sgraffita Splash* from the level 3 in *Locus* 6 and from the level 3 in *Locus* 8 (**Fig. 13: 4**). These are the only specimens found on the excavation to date. Furthermore, fragments of monochrome green glazed ware from level 2 and level 3 are reported. However, it is the monochrome turquoise / blue-green glazed ware (**Fig. 10: 1; Fig. 13: 1, 2, 3; Fig. 17: 1, 2, 3, 4**) the most attested glazed production. These are fragments with glaze both internally and externally, this is highly degraded due to the instability of the alkalis which give the coating a whitish patina and numerous cracks. From a detailed analysis, it emerged that the ceramic is mostly devoid of preparatory clayey coating and the glaze appears with variable thickness and with numerous clay inclusions incorporated into the coating (**Fig. 8**). Although it is not possible to define whole shapes, at the moment we can see that a greater attention was devoted to the external coating, so it can be assumed that the internal part was glazed in order to make the vessel waterproof.

As far as morphology is concerned (**Fig. 4)**, 35.04% of the analyzed pottery cannot be traced back to precise shapes. If we exclude the huge amount of identified flat bases (7 cm <Ø <40 cm), it is clear that there is a prevalence of open shapes compared to closed shapes with a ratio of 3: 2. The former are mainly hand-made, the closed ones are wheel-made. At the current state of research, a one-to-one relationship between shape and fabric has not been identified. The continuation of the work during the next excavation campaigns may confirm or deny what has been reported.

Below is a detailed analysis of the levels under analysis, ordered from the most recent to the oldest, according to the excavation phases.

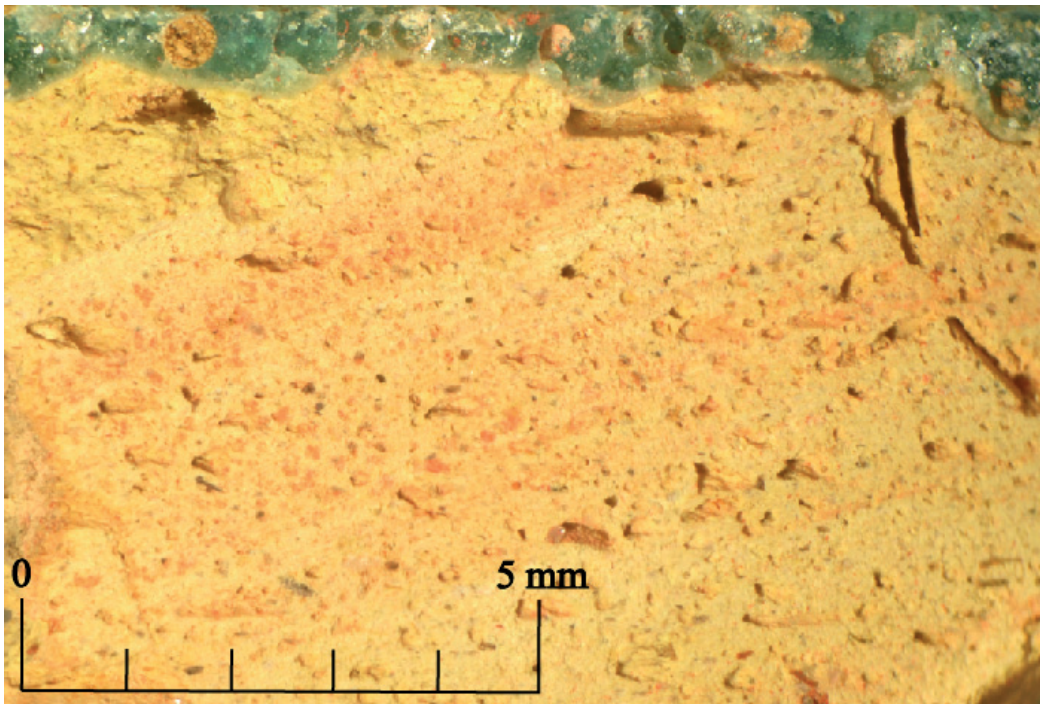


Fig. 8. Macrophotography of a ceramic fragment with a turquoise / blue-green alkaline glassy coating

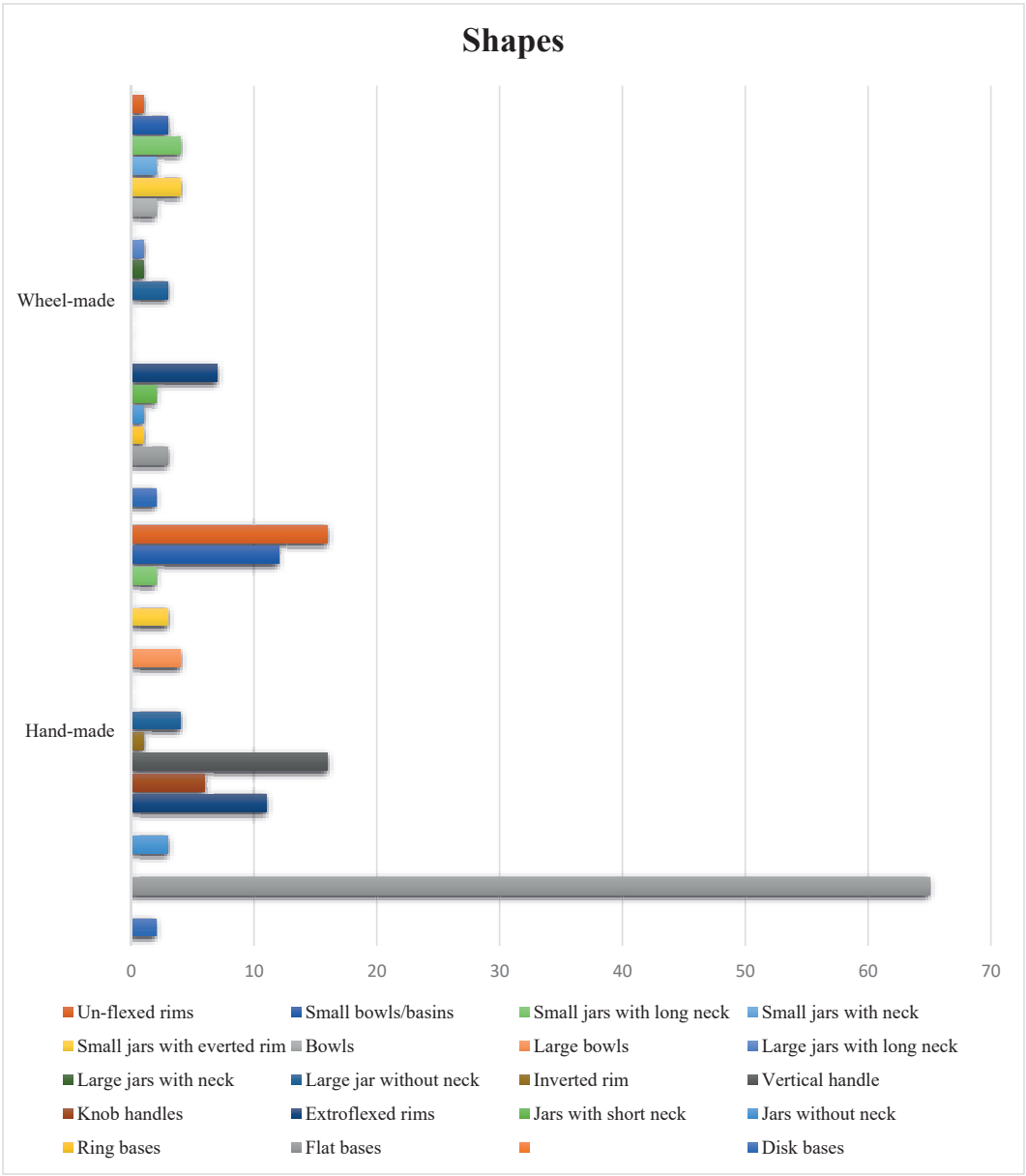


Fig. 9. Shapes organized according to the techniques

Level 2

Level 2 immediately underlies the superficial level of abandonment. It is characterized by the abundant presence of materials mixed with aeolian sand, among which are: vitreous paste bracelets (bangles), ferrite cores, metal jewelry, semiprecious stone necklace vague, millstones, soapstone vases, etc.[24]

The fabrics used are few and mostly fine on average. The most attested is undoubtedly the fabric 1, while the coarse fabrics 9, 12, 19 stand out, all used in an equal number of ceramic types.

Compared to the most ancient levels, the typological variety is limited and mainly concerns coarse and not very diagnostic ceramics, probably useful for food processing.

The greatest variations concern the wheel-made vessels, in itself more subject to changes, characterized by middle size bowls, handled small jars with flat bases or big jars, associated with a fairly limited variety of surface treatments. Polishing, smoothing, single or double slip are accompanied by applied or painted decoration made on presumably food consumption or storage ware.

Certain fragments of ceramic with turquoise glazing (**Fig. 10: 1**), or green[25] (**Fig. 10: 2**), with bitumen coating are attested (**Fig. 10: 5, 6**), as well as fragments of pottery with painted decoration that are partly compared to the post-12th century Jordanian pottery[26] (**Fig. 10: 3**).

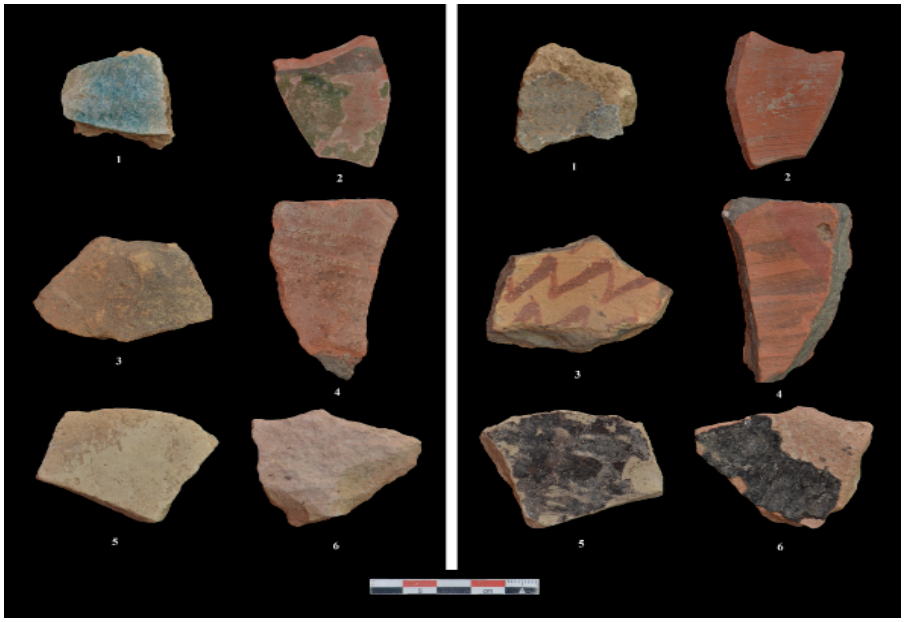


Fig. 10. Selection of fragments from level 2 (external and internal)

24. See Loreto 2016c.

25. As part of the detailed study of the fabrics in fieri, the fabrics of the fragments characterized by a glass coating are also being analyzed. For an example of ceramic with green lead glazing from the level in question, see the table of special fabrics in the appendix (fragment DJ.10.A.132-8).

26. For a comparison, see Johns *et al*. 1989: 86, 92.

Level 3 in Locus 6

The layer underlies level 2 and in turn covers level 4 and is the surface of the later *Locus* 6, that is the 3 × 4m oval structure, delimited by M10, M2 (with postern and architrave), M12, M13. The perimeter wall is partially collapsed (level 2b),[27] and inside burnt materials were found: camel bones, shale pestles, mortars, ceramics, Ottoman pipes, vitreous paste bracelets.[28]

The level is characterized by an imbalance in the quantitative relationships between the ceramic types, which had already begun in the most ancient levels. Wheel-made vessels turn out to be just under a third of those made by hand, with a richer repertoire of coarse fabrics, all more or less equally represented, with the exception of 10 and 17, absent as in other levels.

Most of the hand-made pottery is made up of small-medium open shapes, such as basins and pots, and closed shapes, while not completely excluding medium-large containers that tend to be open. There is only one case of a large jar (**Fig. 12: 7**). There are many rims with a lip with a recess and button or tab handles (**Fig. 12: 3**) or with a single handle as well. The bases are almost always flat (**Fig. 12: 12, 13**) and with a maximum diameter of 25cm. Surface treatments include a high number of polished fragments (**Fig. 12: 4**), with surface lightened, polished (**Fig. 11: 5**) and with different types of coating such as slip of various colors. There is frequent blackening (**Fig. 12: 5, 6, 8**) and burns, in some cases certainly associated with the collapse or in any case with the post-lying phases. It is possible to note the presence of very common ceramic vessels attested in various layers, such as pots with button or tab handles, made with coarse fabric, with simple surface treatments and frequent signs of blackening. These are probably containers for domestic use of local production. The flat bases seem to be consistent with the hypothesis of containers used in direct contact with fire and placed directly on the ground. A separate discussion should be opened for the handles, which are clearly not very functional, especially when the jar is full, which can therefore be of assistance for lifting with ropes. These handles are generally “pulled” from the clayey matrix, or alternatively more rarely they can be applied. On the other hand, if one analyzes in detail the presence of a recess for the lid, we can see that it is a recurring feature in various levels. The recess on the lip, with a semicircular, triangular or cut profile, is made either in the shaping phase or is a sign of wear on the surface. However, in spite of the quantity of rims with the feature in question, the ceramic fragments attributable to lids are extremely rare, suggesting the idea of closures made of non-ceramic material.

Peculiar types from this level are the polished and perforated basins (**Fig. 11: 2**) with a flat base of variable diameter made with different fabrics, and the purple engobe ceramic (**Fig. 12: 2**) with traces of lampblack. In the first case it is possible that the holes were made when the product was in the leather state, hypothetically useful for the easier gas release during the firing of the product without increasing the risk of breakage and without lengthening the manufacturing process.

27. See Loreto 2014: 109.
28. See Loreto 2016.

Fig. 11. Selection of fragments from the level 3 surface of Locus 6

Fig. 12. Selection of fragments from the level 3 surface of Locus 6 (external and internal)

The general features of the analyzed vessels suggest domestic activities, given the obvious preference for less elaborate ceramics and for medium-small and therefore more manageable shapes. Perhaps we could also think about the use of some vases as table ware. The level also returned ceramics characterized by turquoise glazing (**Fig. 13: 1, 2, 3**), also found in other levels. It seems that fragments with conspicuous non-vitreous encrustations also come from the layer in question. These are probably growths linked to post depositional phenomena, totally absent in the ceramics of the other investigated levels (**Fig. 12: 9**).

From this level also comes one of the only two certain fragment of *Sgraffita Splashed* ware (**Fig. 13: 4**), certainly imported, which finds clear comparisons in sites of the Arabian Peninsula such as al-Mabiyat,[29] ʾAbw Ẓabî,[30] Al-Šîḥr,[31] Šarwaîn,[32] as well as in Greater Syria in sites such as Apamea/ʾAfâmîâ e Šaîzar.[33] The imported product is unquestionably of the highest quality, as can also be seen from the lack of deterioration or detachment of the glaze. In fact, it is ceramic widely circulating that has been used and reused even in very late times, making dating difficult in this context.

From the level examined here also comes the only fragment perhaps attributable to a lamp (**Fig. 12: 10**), extremely complex to analyze due to the poor state of conservation and the uniqueness of the finding. In fact, despite what one might expect from the excavation of a settlement, no lamps have been found. The only comparisons that can be made at the moment are empirical and related to the shape and to a few traces of surface treatment that link the find to the Syro-Iraqi productions dated between the 10th and 14th centuries. Although it is not possible to trace the lamp back to a specific type, the Syrian inspiration is clear, consistent with the region's contacts with the northern neighboring areas.

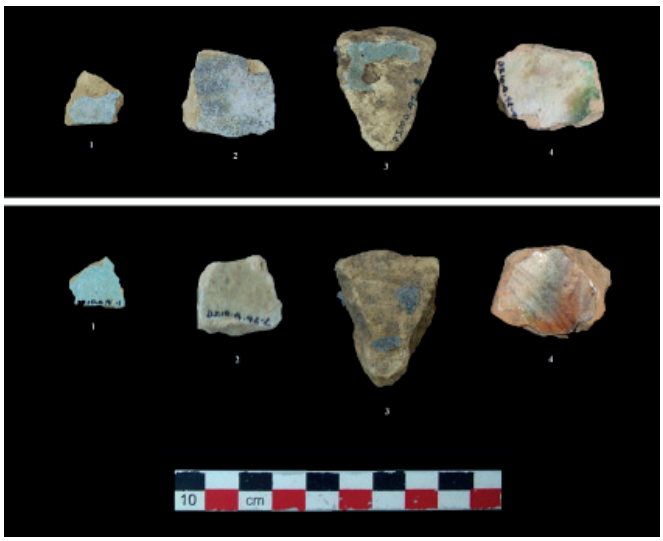


Fig. 13. Fragments of glazed pottery from the level 3 surface of *Locus* 6 (external and internal)

29. See https://scth.gov.sa/en/Antiquities-Museums/Researches/Pages/ExplorationWorkonAlMabiat(Garah)Site.aspx
30. See Carter 2000.
31. See Hardy-Guilbert 2001: 74.
32. See Rougeulle 2001: 207-209.
33. See Vezzoli 2008:145-151.

Level 3 in Locus 8

The level examined here is part of the larger and stirred level 3. Specifically, it is the infill of *Locus* 8, an area defined by M17 and M29 and delimited by *Locus* 7.[34] No objects emerged from the layer but fragments of ceramic pottery.

The variety of fabrics used is wide, especially for the coarse ones, among which, however, 10 and 17 are missing, generally quite rare. Fabrics 4 and 9 are more widely used. The hand-made ceramic appears to be more than triple than the wheel-made.

The wheel-made ware consists of small (**Fig. 14: 1**) or large open forms, characterized by wave engravings (**Fig. 15: 10**) or other decorative elements (**Fig. 14: 2**). Therefore, medium-small cups with ring-shaped foot and red engobe or with disk foot with cord detachment marks are attested (**Fig. 15: 11**). Closed vessel forms are rarer (**Fig. 14: 3**).

As regards the hand-made pottery, the following are attested: over-fired or burnt flat walls and bottoms (**Fig. 15: 12, 13**); simple shapes roughly made with a coarse fabric but with a relatively thin wall (**Fig. 15: 5, 6, 7**); small smoothed jars (**Fig. 15: 4**); pots (**Fig. 15: 3**) and basins with superficial lightening (**Fig. 15: 1, 2**). The large jars are completely missing. Furthermore, this represents the only level in which fragments that appear to be poorly preserved portions of filters are attested (**Fig. 14: 6**). There are fragments of coarse pottery with engraved and impressed (**Fig. 14: 5**) and painted (**Fig. 14: 7, Fig. 16: 5, 6**) decoration.

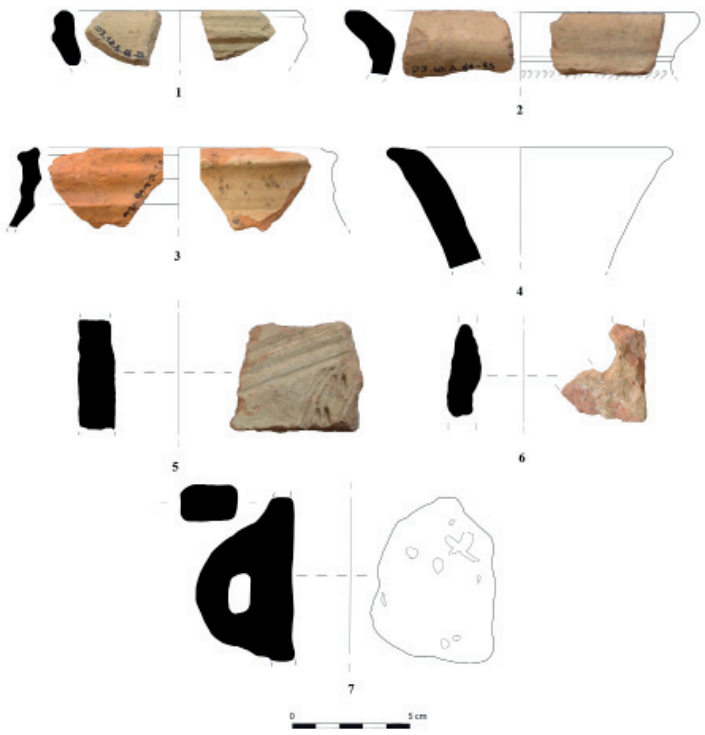


Fig. 14. Selection of fragments from Level 6 in Locus 8

34. See Loreto 2014: 128, 129.

Fig. 15. Selection of pottery fragments from Level 3 in *Locus* 8 (external and internal)

The peculiar elements are the following: ceramic fragments with bituminous coating (**Fig. 16: 7, 8, 9, 10, 11**)[35] with or without white engobe, fragments characterized by painted decoration perhaps imported (**Fig. 16: 1, 2, 3**)[36] possibly attributable to the post-12th century phase.[37]

The already articulated picture is made even more complex by the presence of fragments with a turquoise / blue-green alkaline vitreous coating (**Fig. 17: 1, 2, 3, 4**); a late-Nabataean / Early-Islamic vertical handle (**Fig. 15: 9**); a fragment of ceramic with a green vitreous coating of difficult interpretation (**Fig. 17: 5**) and ring bases with green glaze on a white engobe. Finally, a pottery fragment with a splash of paint under the glaze was also found.[38]

35. For a detailed photo of the fragment DJ.10.A/66-67 (imported?) see the table of peculiar fabrics in the Appendix.
36. In the Appendix you can see the macro photo of the fabric of the DJ.10.A/ 66-11 fragment.
37. For comparison, see Johns *et al*. 1989: 86, 92.
38. Since this is a unique fragment almost certainly referable to a *Sgraffita Splashed*, see the discussion in the previous paragraph (p. 130), where the analysis is carried out in light of the discovery of a fragment in better condition.

Fig. 16. Selection of fragments from the level 3 in *Locus* 8 (external and internal)

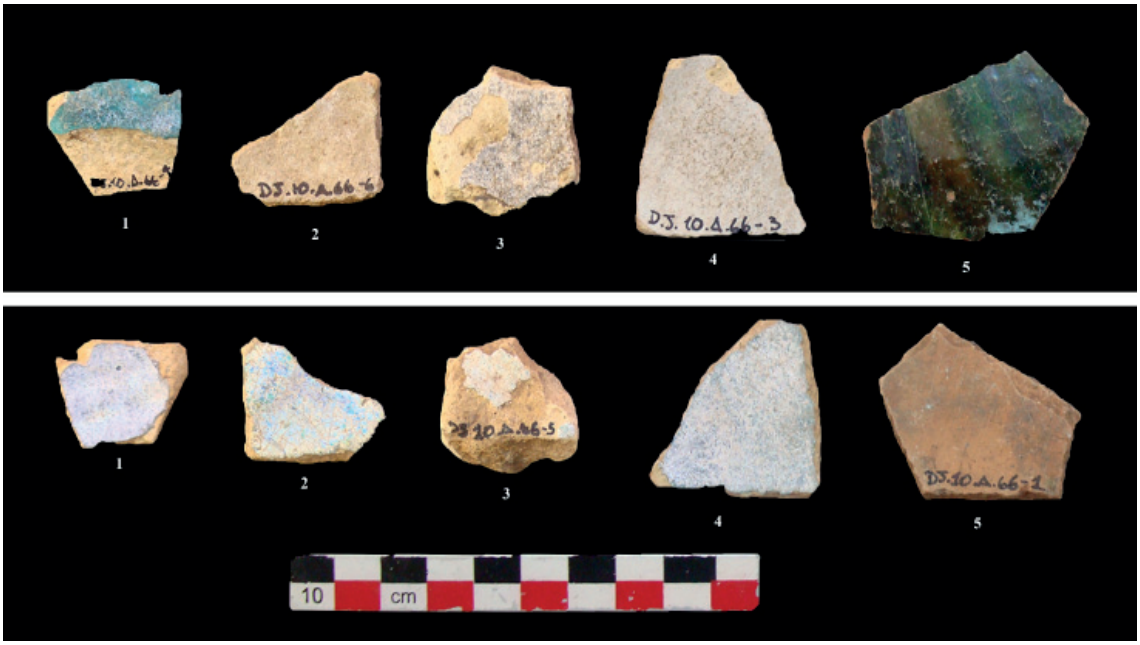


Fig. 17. Glazed pottery fragments from level 3 in *Locus* 8 (external and internal)

Level 11 in Locus 9 – removal

From this level [39] mostly fragments of vases made with coarse fabric emerged (18 is the most attested).

The hand-made pottery includes large basins or pots with holes, tab or button handles (**Fig. 18: 4**), and medium-sized basins and large hinged jars. The bases are always flat, can be concave or thinned, and have a diameter that can reach 25cm. The surface treatment tends to be approximate: the fragments are smoothed or polished, characterized by superficial lightening (**Fig. 19: 1, 2, 3, 4, 5, 6**). The only hand-made decorated fragment has traces of paint that seems to be the result of an accidental dripping rather than a proper ornament.

Some vessel types are peculiar of this level: these are medium-sized basins with oblique walls and button handles, sometimes characterized by round holes, perhaps made in the post-firing stage. The surface is characterized by superficial lightening. The vessel type with a more conspicuous presence, however, is of little help in understanding the chronology: in fact, it is common ceramic with ferrous fabric, probably used for cooking, as confirmed by the frequent blackening.

The very few fragments of wheel-made vessels, on the other hand, refer to jars of various sizes (**Fig. 18: 1, 3**) with flat, disc or ring bases, and very few cups (**Fig. 18: 2**), all slipped.

Part of the ceramic of this level is made up of vessels whose lip has a recess for the lid. Sometimes, it could be a groove compatible with the wear of the surface. Whatever the purpose of each jar was, the desire to preserve the contents from evaporation during cooking and storage, consistent with a dry and arid climate, seems plausible.

It should also be noted the presence of a fragment characterized by a recess obtained on the internal surface and spiral-shaped signs of wear (**Fig. 19: 5**). The hollow was made in the post-firing phase and evidently concerns the second life of the ancient fragment, perhaps used as a small mortar.

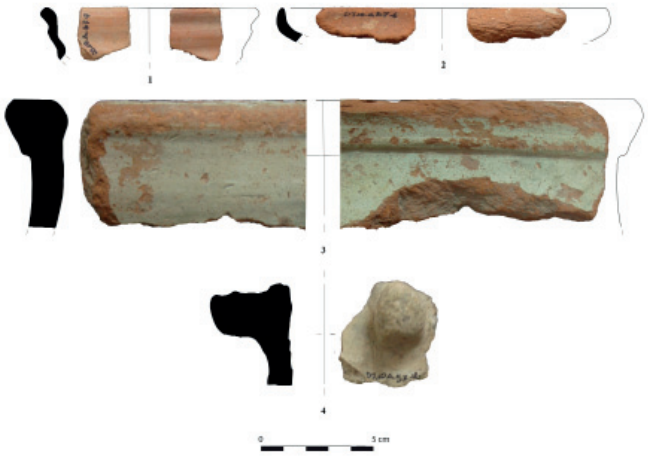


Fig. 18. Selection of fragments from level 11 in *Locus* 9 - removal

39. See Loreto 2014: 129, 149.

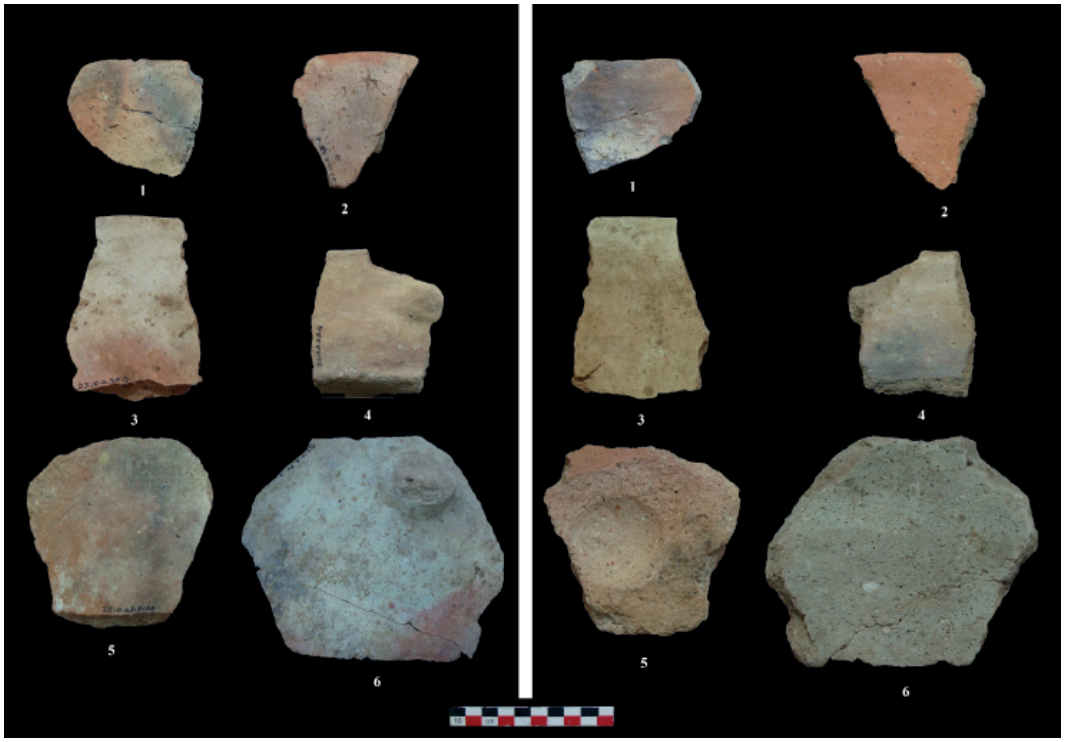


Fig. 19. Selection of fragments from level 11 in *Locus* 9 - removal (external and internal)

In conclusion, this deposit appears to contain not quite fine specimens; on the contrary, homogeneous vessel types are frequent and mainly associated with food processing or food consumption activities, perhaps carried out in *Locus* 9, where also few small jars may have been dedicated to storage purposes, that is liquid or dry items. The indications provided by the level are significant. Compared to the most ancient layer, a clear change in the composition of the archaeological material is perceived, perhaps as an indirect consequence of a deeper change. There is a gradual abandonment of a series of more fine productions, in favor of a greater presence of coarse ware presumably locally produced. This perception is more pronounced as one moves towards the more recent levels.

Level 11 in Locus 9

Level 11 consists of a layer of aeolian sand deposited on the collapse of Building A in *Locus* 9, which is the main Nabatean-Roman building in Trench 1.[40] It is still a level with the coexistence of pre-Islamic and Islamic ware, therefore useful for understanding the continuity phenomena of some vessel types or the abandonment of others.

40. For further details regarding Building A, see Loreto 2014: 132-138.

The pottery is made almost entirely by hand-made specimens, with the exception of sparse wheel-made one, such as small neckless jars or jars with short necks (**Fig. 20: 1, Fig. 21: 1**) or small bowls with oblique wall. Some wheel-made fragments show traces of lampblack perhaps associated with the post-lying phases. In some cases, it is pottery present in the layer under analysis and then again in level 3, however, only a complete observation of the material from the stratigraphic context can provide information relevant to a real continuity or discontinuity.

There are a couple of fragments with large holes (**Fig. 20: 3**) whose function is perhaps attributable to the passage of the ropes for suspension or to the reuse of fragments of broken vessels as weights. Comparisons with other sites, such as Faîlakà, may confirm this hypothesis.[41]

The most attested vessel type consists of small basins or small jars with necks equipped with button sockets and vertical handles. The white slip has been hastily brushed, and it seems that the drafting took place on buttons and vertical handles, in some cases with a particularly uneven and dense coating. However, it is little diagnostic ceramics as it is present in almost all levels, an evident symptom of an indisputable cultural continuity. The remaining pottery is made up of medium-small pottery, mainly open shapes with a white or red clay coating that is more functional than aesthetic. The closed forms have slight signs of lampblack, the hollow for the lid on the lip and they are frequently provided with handles (**Fig. 20: 2**). The bases are always flat (**Fig. 21: 4, 5**) and rarely exceed 15cm in diameter.

The only decorated type has a grainy yellowish engobe and paint dripping, perhaps accidental.

The earliest stratigraphic evidence of bituminous-coated ceramic also comes from this level (**Fig. 21: 2, 3**).

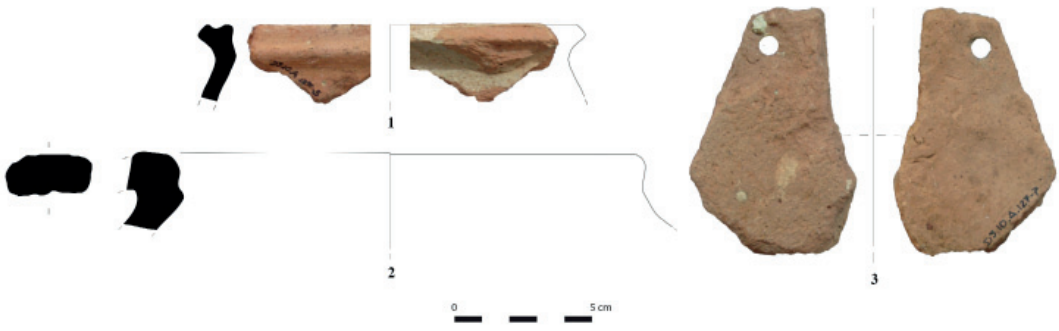


Fig. 20. Selection of fragments from level 11 in Locus 9

41. See Patitucci, Uggeri 1984, tav. LVc, Cia. Specifically, it is a weight obtained from a fragment of a glazed jar, unlike the fragment found in Dûmat which has no coating. See also Kennet 2014: 56. Specifically, ceramic fragments have been processed to obtain fishing nets.

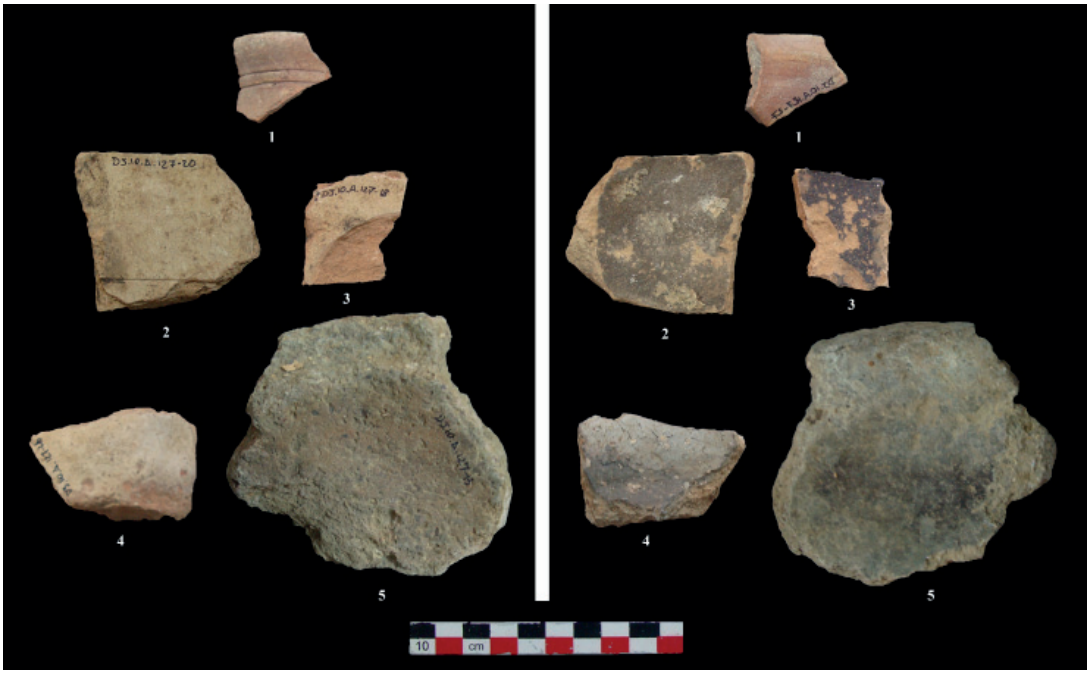


Fig. 21. Selection of fragments from level 11 in Locus 9 (external and internal)

If we consider the entire stratigraphy, some of these shards can rightly be considered fragments of *Torpedo Jars*. Although shape, content and function are quite well known, it remains to investigate the trade system that revolves around them and which directly or indirectly also involves Dûmat al-Jandal. Among the numerous comparisons are cited for example: Madâʾin Ṣâliḥ/al-Ḥiğr;[42] Ḫâdimah;[43] Ṣîr Banî Îâs;[44] and the maritime and terrestrial archaeological sites of Ḫwzistân and of the Persian Gulf.[45] Local pottery fragments (at least apparently) coated with bitumen have also been identified at Dûmat al-Jandal. In fact, for example, a fragment with bitumen also in fracture was identified, evidently reused or repaired. In the opinion of the writer, perhaps a small part of the cargo sold by ships along the coasts used to travel by land crossing the desert for commercial purposes, alongside a local or sub-regional production of pottery characterized by black, possibly bituminous coating.

42. See Durand, Geber 2008: 289, fig. 23.
43. See Kennet 2013.
44. See Carter *et al.* 2011.
45. See Mousavi *et al.* 2011.

APPENDIX – FABRIC CHARTS

Fabric fiches are introduced below in increasing numerical order. First, those pertaining to fine and medium fine depurated fabrics are listed, then those relative to the coarse fabrics follows.

It should be noted that each fabric fiche contains one or more picture of the same fabric. The choice of displaying more macro photos of the same fabric is useful to highlight any similarities or microscopic differences in the same fabric identified in different historical periods (or archaeological strata), or to highlight peculiarities. Both pictures taken from DÛMA I,[46] marked with an asterisk, and macrophotographs made using a microscope and processed using the Focus Stacking[47] techniques at the CNR - Montelibretti (RM) are displayed.[48]

The fiches were made starting from the preliminary studies conducted,[49] and then recalibrated and analyzed by the writer, under the same light conditions and with the aid of a lens for hard stones, that is a monocle with 15X magnification. It should be noted that at the moment the study for the definition of the relative sources of supply of the clay is underway, as well as the petrographic analysis that may help to confirm or deny the proposed classification of fabrics. The following fiches introduce samples of each fabric according to: [50]

- color: observed along the cross-section (body) of the fragment (newly fractured) based on the Munsel soil color chart;
- luster: body light reflection. Values: high, medium, low;
- hardness: identified on the basis of the ease with which the shard is scratched with a fingernail. Values: soft, medium, hard;
- fracture: generating a cross-section clean, flaky, subconchoidal;
- texture: generating a cross-section harash, hackly, granular, smooth, soft, chalky;
- relative porosity/compactness based on the vacuols' frequency: abundant, moderate, sparse; plus, vacuoles sorting: regular, medium, irregular; plus, vacuoles shape: rounding, angular, sub-angular, oblong, round, irregular; plus, vacuoles size: fine, medium, large, variable;[51]

46. See Siméon 2014

47. Macrophotography with Focus Stacking is a photographic technique that allows obtaining photos with an optical microscope with a considerable depth of field, i.e., well defined for the entire visible depth of the object under examination. The Focus Stacking technique consists in taking a series of photos by gradually changing the focus of the microscope between one and the other. Imaging processor software combine the shots, taking advantage of those parts of the image that appear to be in focus. Specifically, the BRESSER microscope and NIKON D3000 camera body were used and the Helicon Focus software was used for processing. The photos have been cut into circles with a diameter of 3 mm so that the ceramic bodies are easily comparable.

48. The author collaborated with Ombretta Tarquini, Marcello Colapietro and Augusto Pifferi for the macrophotos.

49. See Siméon 2014.

50. The description was based on the works of Shepard (1985: 102-138) and Orton, Tyers, Vince (2003: 132-140, 231-242). For comparison with other studies that follow the same methodology, see Fusaro 2014 and Fusaro, Pavan 2016.

51. In the absence of a unique reference, this item is based on internal comparisons.

- inclusions/temper: particularly detailed item. The fields, distinguished by color and type of inclusion, have been filled in as follows, for the frequency: abundant, moderate, sparse; for sorting: regular, medium, irregular. We decided to keep a simple general definition based on autoptic observation, a possible purely hypothetical mineralogical association is reported in the footnote, until the results of the petrographic analyzes, still in progress, are obtained;
- drawings and pictures: the section is dedicated to photos of the internal and external surface and to some associated ceramic forms. It should be noted that for the benefit of the reader, vessel forms identified during the excavation campaigns after 2015 have been inserted;

Obviously, for common ceramics the declination of each body is not unambiguous and clear-cut.

Each of them is marked by a numerical nomenclature whose order is based on the chromatic affinity of the fabrics. This system of numerical indicators allows for completion and refinements during the next campaigns: in fact, if new fabrics are identified in the future, these could be marked with an increasing numerical identifier.

Finally, it should also be noted that 22 fabrics have been identified, but not all of them have been found in the Islamic or transitional levels analyzed here. These are not overlooked as they are considered useful for interpreting the pre-Islamic tableware presented in this volume (see Loreto & Cocozza).

FABRIC 1

COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
7.5Y-6/8 7.5Y-7/6 7.5Y-7/8 10YR-6/1	Low	Hard	Clean	Smooth	Sparse Medium	Round Sub-angular	Fine

INCLUSIONS/TEMPER

MINERAL

	Surface				Body				VOIDS PLANT-LIKE	
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
SAND	Moderate	Fine		Medium					Sparse	Surface Body
GREY					Moderate	Variable	Irregular	Irregular		
BROWN					Moderate	Variable	Round Sub-angular	Irregular		
WHITE					Moderate	Variable	Round Sub-angular	Irregular		

GENERAL REMARKS It is possible that white inclusions are quartz.
The hand-made vessels' open shapes associated with fabric 1 do not find evidence in the Islamic ceramics analysed during the sixth excavation campaign.

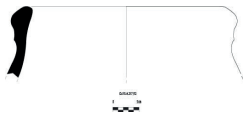
DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

HAND-MADE, OPEN SHAPE

HAND-MADE, CLOSED SHAPE

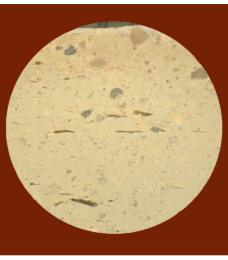


PICTURES

OUTER SURFACE

INNER SURFACE

FABRIC 2



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
5YR-8/1 10YR-8/3	Low	Hard	Flaky	Irregular	Abundant Irregular	Round Irregular	Variable

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
SAND	Moderate	Fine	Round	Regular	Abundant	Fine	Round	Medium	Sparse	Body
MICA	Moderate	Fine	Round Sub-angular	Regular	Moderate	Fine	Round Sub-angular	Medium		
GREY	Sparse	Fine	Sub-angular	Medium	Sparse	Fine	Sub-angular	Medium		
BROWN					Sparse	Fine	Round	Irregular		
RED					Moderate	Fine	Round	Irregular		
GLASS-LIKE					Sparse	Variable	Irregular			

GENERAL REMARKS The fabric includes a variant, possibly due to a different firing process or to a greater amount of fine sand. It is assumed that it is a calcareous fabric fired in a reducing environment.

DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

HAND-MADE, OPEN SHAPE

HAND-MADE, CLOSED SHAPE

PICTURES

OUTER SURFACE

INNER SURFACE

FABRIC 3

COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
2.5Y-8/1 5YR-8/2 5YR-8/3 10YR-8/3	Low	Medium	Clean	Smooth	Abundant Medium	Sub-angular Round	Variable

INCLUSIONS/TEMPER

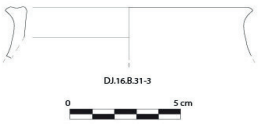
	MINERAL								VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
MICA					Sparse	Fine		Irregular		
BLACK	Sparse	Fine	Round	Irregular	Sparse	Fine	Round	Irregular		
BROWN	Sparse	Variable	Sub-angular Irregular	Irregular						
WHITE	Sparse	Medium	Round	Irregular	Sparse	Variable	Irregular	Irregular		

GENERAL REMARKS It is possible that it is a calcareous fabric with siliceous and quartzite temper. It is characterized also by a central darker band of variable thickness.

DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE



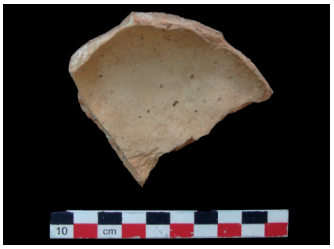
HAND-MADE, OPEN SHAPE

HAND-MADE, CLOSED SHAPE

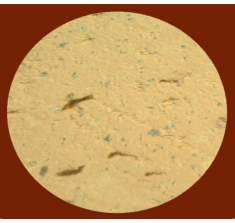
PICTURES

OUTER SURFACE

INNER SURFACE



FABRIC 4



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
2.5Y-8/2 2.5Y-8/3	Low	Hard	Clean	Irregular	Moderate Medium	Irregular	Fine

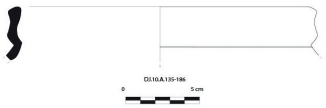
INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
GREY	Sparse	Fine	Sub-angular	Irregular	Abundant	Fine	Sub-angular	Regular	Sparse	Surface Body

GENERAL REMARKS It has been attested a variation (accidental or intentional) characterized by a greyish heart, perhaps the result of firing oxidizing environment. Possible calcareous fabric with siliceous temper.

DRAWINGS **PICTURES**

WHEEL-MADE, OPEN SHAPE **WHEEL-MADE, CLOSED SHAPE** **OUTER SURFACE**



HAND-MADE, OPEN SHAPE **HAND-MADE, CLOSED SHAPE** **INNER SURFACE**

FABRIC 5

COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
7.5R 2/2 rgb(66, 44, 44) 7.5R 5/12		Hard	Subconchoidal		FREQUENCY AND SORTING	ROUNDING	SIZE

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
BLACK					Moderate	Fine	Irregular	Medium		
WHITE					Sparse	Variable	Irregular	Irregular		

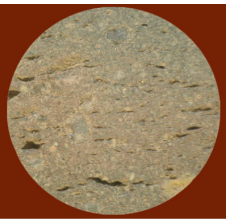
GENERAL REMARKS	Fabric sporadically attested in the pre-Islamic levels of Trench 1 - Sector A. Not identified during the sixth excavation campaign in the Islamic levels of the same trench nor in the pre-Islamic levels of the trenches 8, 9. Considering the rarity of the fabric in question, it could be an import.

DRAWINGS — **PICTURES**

WHEEL-MADE, OPEN SHAPE | WHEEL-MADE, CLOSED SHAPE | OUTER SURFACE

HAND-MADE, OPEN SHAPE | HAND-MADE, CLOSED SHAPE | INNER SURFACE

FABRIC 6



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
2.5YR-6/3 2.5YR-6/11 7.5YR-5/6 7.5YR-6/11 10R 3/2, 10R 4/8	Low	Soft	Subconchoidal	Garnular	Sparse Irregular	Subangular Round	Medium

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
MICA					Sparse	Fine		Irregular		
BLACK	Moderate	Fine	Round	Medium	Sparse	Medium	Oblong	Irregular		
BROWN					Moderate	Variable	Sub-angular	Medium		
YELLOW					Sparse	Medium	Sub-angular	Irregular		
WHITE					Moderate	Fine	Round Sub-angular	Irregular		
GLASS-LIKE					Sparse	Fine	Sub-angular	Irregular		

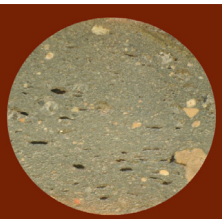
GENERAL REMARKS Possibly resulted from a firing in an oxidizing environment.
The fabric is very rare (it can be an import): it is attested in Sector A, Trench 1, especially in pre-Islamic levels and it is totally absent in trenches 8, 9.

DRAWINGS **PICTURES**

WHEEL-MADE, OPEN SHAPE **WHEEL-MADE, CLOSED SHAPE** **OUTER SURFACE**

HAND-MADE, OPEN SHAPE **HAND-MADE, CLOSED SHAPE** **INNER SURFACE**

FABRIC 7



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
2.5Y 6/2 2.5Y 6/2 10Y 6/2	Low	Hard	Clean	Garnular	Sparse Irregular	Sub-angular Round	Medium

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
SAND	Abundant	Fine		Irregular	Abundant	Fine		Regular		
WHITE	Sparse	Variable	Sub-angular	Irregular	Abundant	Variable	Sub-angular Round	Medium		
YELLOW					Moderate	Variable	Sub-angular Round	Medium		

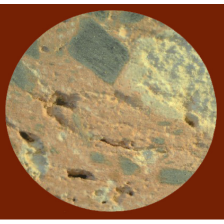
GENERAL REMARKS It could be a fabric fired in a reducing environment, in some cases with early exposure to air. Inclusions might be quartz sand or perhaps quartzite.
This fabric has been identified in the pre-Islamic levels of Sector A , Trench 1. The fragments are ascribable to wheel-made pottery, specifically bowls or various size closed shapes. On the contrary, the fabric has been identified in very few cases in the Islamic levels of the same trench and it is completely absent in pre-Islamic levels of trenches 8, 9.

DRAWINGS | **PICTURES**

WHEEL-MADE, OPEN SHAPE | **WHEEL-MADE, CLOSED SHAPE** | **OUTER SURFACE**

HAND-MADE, OPEN SHAPE | **HAND-MADE, CLOSED SHAPE** | **INNER SURFACE**

FABRIC 8



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
5YR-7/3 5YR-7/4 5YR-7/6 5YR-8/4	Low	Hard	Clean	Garnular	Moderate Medium	Irregular	Variable

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
									Sparse	Body
BLACK	Sparse	Fine	Angular	Irregular	Abundant	Variable	Angular	Regular		
BROWN	Moderate	Variable	Angular	Irregular	Moderate	Fine	Angular	Irregular		
RED	Sparse	Fine	Sub-angular	Irregular	Sparse	Fine	Sub-angular	Irregular		
YELLOW	Abundant	Medium	Round	Irregular	Abundant	Medium	Round	Regular		
WHITE	Abundant	Variable	Sub-angular Round	Regular	Abundant	Variable	Sub-angular Round	Regular		

GENERAL REMARKS

DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

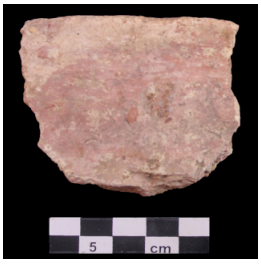
HAND-MADE, OPEN SHAPE

HAND-MADE, CLOSED SHAPE

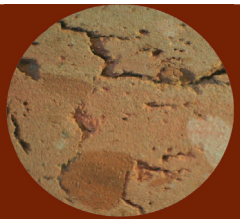
PICTURES

OUTER SURFACE

INNER SURFACE



FABRIC 9



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
2.5YR-7/4 5YR-6/8 5YR-7/4	Low	Hard	Flaky	Hackly	Moderate Irregular	Oblong Round	Fine

INCLUSIONS/TEMPER

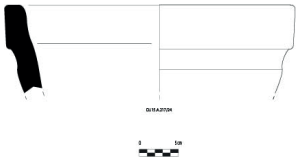
MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
PEBBLES					Sparse	Fine	Round	Irregular		
GROG/ CHAMOTTE					Moderate	Variable	Angular	Irregular		
MICA					Sparse	Fine		Irregular		
GREY	Sparse	Variable	Irregular	Irregular	Sparse	Variable	Irregular	Irregular		
BROWN					Sparse	Variable	Angular	Irregular		
YELLOW					Sparse	Medium	Angular	Irregular		
WHITE					Moderate	Fine	Sub-angular	Medium		

GENERAL REMARKS Possibly a limestone fabric with a medium-low iron quantity. Also, calcium carbonate and calcite could be the included materials.

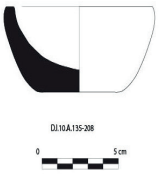
DRAWINGS

WHEEL-MADE, OPEN SHAPE

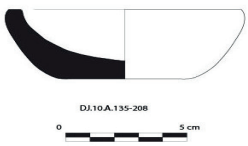
WHEEL-MADE, CLOSED SHAPE



HAND-MADE, OPEN SHAPE



HAND-MADE, CLOSED SHAPE

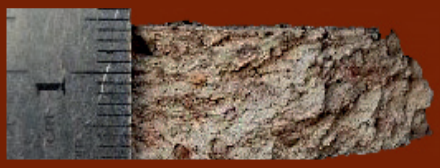


PICTURES

OUTER SURFACE

INNER SURFACE

FABRIC 10



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
5YR 7/2 5YR 9/4	Low	Hard	Flaky	Irregular	Sparse Irregular	Irregular	Variable

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
									Sparse	Body
BLACK	Sparse	Medium	Round	Irregular	Sparse	Medium	Round	Irregular		
GREY	Sparse	Medium	Round	Irregular	Sparse	Medium	Round	Irregular		
BROWN					Sparse	Medium	Round	Irregular		
YELLOW					Sparse	Medium	Round	Irregular		
WHITE					Sparse	Medium	Round	Irregular		

GENERAL REMARKS

DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

HAND-MADE, OPEN SHAPE

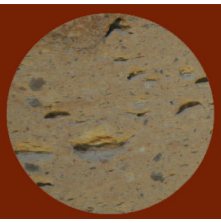
HAND-MADE, CLOSED SHAPE

PICTURES

OUTER SURFACE

INNER SURFACE

FA-BRIC 11



CO-LOUR	LUS-TER	HARD-NESS	FRAC-TURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUEN-CY AND SORTING	ROUN-DING	SIZE
7.5YR-8/4 10YR-8/3	Low	Soft	Clean	Granular	Sparse Regular	Irregular	Fine

INCLUSIONS/TEMPER

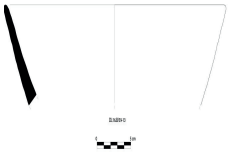
MINERAL									VOIDS PLANT-LIKE	
		Surface			Body					
COLOUR	FREQUEN-CY	SIZE	ROUN-DING	SOR-TING	FREQUEN-CY	SIZE	ROUN-DING	SOR-TING	FREQUENCY	SORTING
GREY	Moderate	Medium	Round	Medium	Abundant	Fine	Sub-angular Round	Irregular		
WHITE					Sparse	Medium	Sub-angular Round	Irregular		
GENE-RAL RE-MARKS										

DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

HAND-MADE, OPEN SHAPE



HAND-MADE, CLOSED SHAPE

PICTURES

OUTER SURFACE

INNER SURFACE

FABRIC 12

COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
7.5YR-7/4 7.5YR-7/6	Low	Soft	Flaky	Harash	Abundant Irregular	Sub-angular/ Oblong	Fine

INCLUSIONS/TEMPER

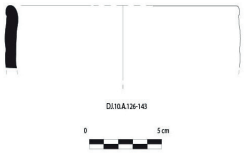
MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
SAND	Moderate	Fine	Round	Medium	Sparse	Fine		Regular	Moderate	Body
BLACK	Abundant	Fine	Round	Medium	Moderate	Fine	Sub-angular	Irregular		
GREY					Moderate	Fine	Sub-angular	Irregular		
BROWN					Sparse	Fine	Round	Irregular		
WHITE					Sparse	Variable	Sub-angular Round	Irregular		
GLASS-LIKE					Sparse	Medium	Sub-angular Round	Irregular		
GENERAL REMARKS										

DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

HAND-MADE, OPEN SHAPE

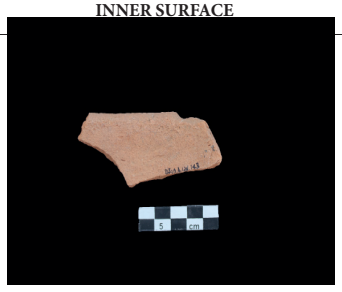


HAND-MADE, CLOSED SHAPE

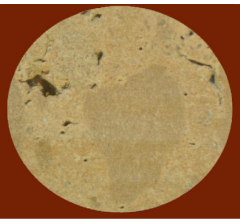
PICTURES

OUTER SURFACE

INNER SURFACE



FABRIC 13



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
2.5YR-7/4 7.5YR-8/6	Low	Medium	Subconchoidal	Irregular	Moderate Irregular	Oblong Round	Variable

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
GROG CHAMOTTE	Abundant	Medium	Irregular	Medium	Abundant	Medium	Irregular	Medium		
RED	Moderate	Variable	Angular	Irregular	Moderate	Variable	Angular	Irregular		
WHITE	Moderate	Variable	Angular	Irregular	Moderate	Variable	Angular	Irregular		

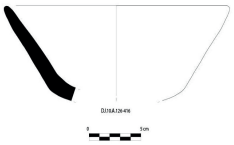
GENERAL REMARKS Possibly a calcareous fabric, with iron oxides and calcite inclusions. Also, mudstone or even dried clay lumps might have been inserted in the fabric.

DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

HAND-MADE, OPEN SHAPE



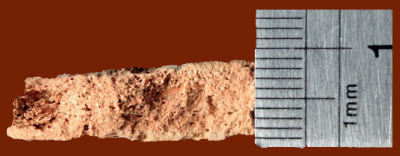
HAND-MADE, CLOSED SHAPE

PICTURES

OUTER SURFACE

INNER SURFACE

FABRIC 15



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
7.5YR-7/6 5YR-8/4	Low	Soft	Flaky	Irregular Chalky	Abundant Regular	Sub-angular Oblong	Variable

GLEY1-8/5gy

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
SAND	Abundant	Fine		Regular	Abundant	Fine		Regular	Abundant	Body
MICA					Moderate	Fine		Medium		
WHITE	Moderate	Medium	Irregular	Irregular	Moderate	Variable	Irregular	Irregular		

GENERAL REMARKS The fabric results to be rare in pre-Islamic levels of Sector A, Trench 1 and it is completely absent in trenches 8, 9 in the pre-Islamic levels.

DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

HAND-MADE, OPEN SHAPE

HAND-MADE, CLOSED SHAPE

PICTURES

OUTER SURFACE

INNER SURFACE

FABRIC 16

COLOUR	LUSTER	HARD-NESS	FRAC-TURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUEN-CY AND SORTING	ROUN-DING	SIZE
7.5YR-7/6 7.5YR-8/4 GLEY1-8/5gy	Low	Medium	Flaky	Granular	Sparse Irregular	Sub-angular Oblong	Variable

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUEN-CY	SIZE	ROUN-DING	SOR-TING	FREQUEN-CY	SIZE	ROUN-DING	SOR-TING	FREQUENCY	SORTING
									Sparse	Surface Body
GROG CHAMOTTE	Moderate	Variable	Angular	Irregular	Moderate	Variable	Angular	Irregular		
BLACK	Abundant	Medium	Sub-angular Oblong	Regular	Abundant	Medium	Angular Sub-angular	Regular		
RED	Sparse	Variable	Angular	Irregular	Sparse	Variable	Angular	Irregular		
WHITE	Moderate	Medium	Angular Sub-angular	Medium	Moderate	Medium	Angular Sub-angular	Medium		

GENERAL REMARKS	This might be a calcareous clay with a medium-low iron content. The black inclusions could be splinters of schist, accompanied by iron oxides and calcite (the latter melting temper, or maybe in part perhaps naturally present in the clay).

DRAWINGS | **PICTURES**

WHEEL-MADE, OPEN SHAPE | **WHEEL-MADE, CLOSED SHAPE** | **OUTER SURFACE**

HAND-MADE, OPEN SHAPE | **HAND-MADE, CLOSED SHAPE** | **INNER SURFACE**

FABRIC 17

COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
5YR-7/6 5YR-8/4 7.5-7/4 10YR-6/1	Low	Hard	Clean	Irregular	Sparse Irregular	Oblong	Variable

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
BLACK	Sparse	Fine	Angular	Irregular	Abundant	Medium	Irregular	Irregular	Abundant	Surface Body
BROWN	Sparse	Medium	Angular	Medium	Sparse	Fine	Angular	Irregular		
ORANGE	Sparse	Fine	Angular	Medium	Sparse	Fine	Angular	Irregular		
WHITE	Sparse	Variable	Angular	Irregular	Moderate	Variable	Irregular	Irregular		

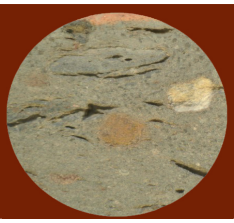
GENERAL REMARKS Possibly a limestone fabric.
Temper inclusions could be schist, ferrous oxides and feldspar.
New, more recent developments are propelling towards the hypothesis of an importation.
In addition, this fabric is rare in pre-Islamic levels of Sector A, Trench 1, where it is associated with large closed pots, and completely absent in trenches 8, 9.

DRAWINGS | **PICTURES**

WHEEL-MADE, OPEN SHAPE | **WHEEL-MADE, CLOSED SHAPE** | **OUTER SURFACE**

HAND-MADE, OPEN SHAPE | **HAND-MADE, CLOSED SHAPE** | **INNER SURFACE**

FABRIC 18



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
7.5Y-6/8 7.5Y-7/8 2.5Y 6/2 10Y 6/2	Medium	Hard	Clean	Harash	Sparse Irregular	Oblong Irregular	Variable

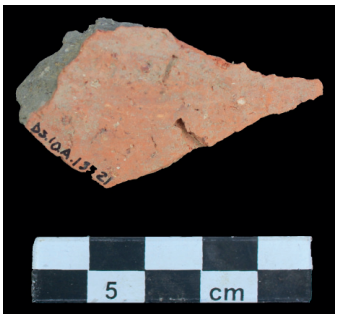
INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
		Surface			Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
BROWN					Moderate	Medium	Irregular	Irregular		
YELLOW					Sparse	Medium	Round	Irregular		
WHITE	Sparse	Variable	Angular	Irregular	Moderate	Variable	Irregular	Irregular		

GENERAL REMARKS

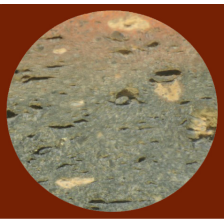
DRAWINGS **PICTURES**

WHEEL-MADE, OPEN SHAPE **WHEEL-MADE, CLOSED SHAPE** **OUTER SURFACE**



HAND-MADE, OPEN SHAPE **HAND-MADE, CLOSED SHAPE** **INNER SURFACE**

FABRIC 19



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS		
					FREQUENCY AND SORTING	ROUNDING	SIZE
2.5Y-6/1 2.5YR-7/6 5Y-6/1 GLEY 2-5/5B	Low	Hard	Flaky	Irregular	Moderate Irregular	Angular Round	Variable

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
		Surface			Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
BLACK					Sparse	Fine	Angular	Irregular	Sparse	Body
GREY	Sparse	Variable	Sub-angular	Irregular	Sparse	Variable	Sub-angular	Irregular		
WHITE	Sparse	Fine	Round	Irregular	Moderate	Variable	Round	Irregular		

GENERAL REMARKS

DRAWINGS

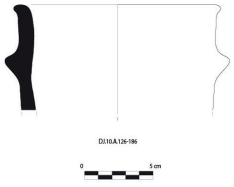
WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

PICTURES

OUTER SURFACE

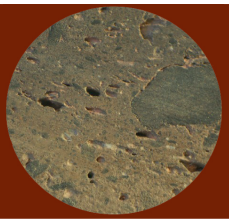
HAND-MADE, OPEN SHAPE



HAND-MADE, CLOSED SHAPE

INNER SURFACE

FABRIC 20



COLOUR	LUSTER	HARDNESS	FRACTURE	TEXTURE	POROSITY/COMPACTNESS
2.5YR 4/2 7.5R 4/2	Low	Medium	Clean	Irregular	FREQUENCY AND SORTING: Sparse Regular ROUNDING: Sub-angular SIZE: Fine

INCLUSIONS/TEMPER

MINERAL									VOIDS PLANT-LIKE	
	Surface				Body					
COLOUR	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SIZE	ROUNDING	SORTING	FREQUENCY	SORTING
BLACK					Sparse	Fine	Angular	Irregular		
RED	Sparse	Medium	Angular	Irregular	Sparse	Medium	Angular Sub-angular	Irregular		
WHITE	Sparse	Large	Angular	Irregular	Abundant	Medium	Angular Sub-angular	Medium		

GENERAL REMARKS The temper inclusions might be ferrous oxides and feldspar.
The fabric is very rare in the Islamic *corpus*, completely absent in trenches 8, 9.

DRAWINGS

WHEEL-MADE, OPEN SHAPE

WHEEL-MADE, CLOSED SHAPE

HAND-MADE, OPEN SHAPE

HAND-MADE, CLOSED SHAPE

PICTURES

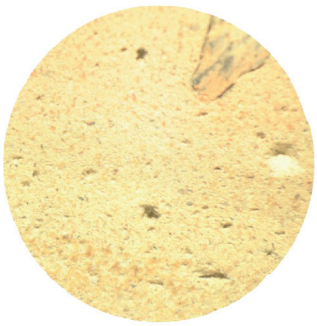
OUTER SURFACE

INNER SURFACE

Peculiar fabrics

The table below shows macrophotos of a selection of peculiar fabrics. Each image has a circumference of 3 mm.

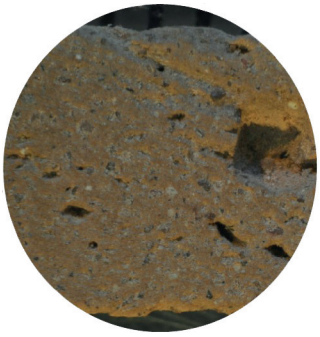
There are two photos of the DJ.10.A.66-67 in order to highlight the presence of inclusions (accidental or not) and peculiarities.



DJ.10.A.42-4

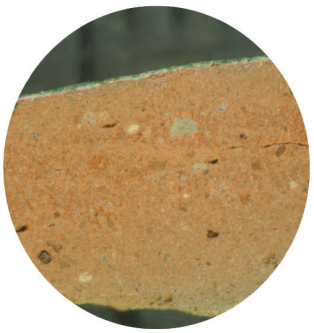
DJ.10.A.66-11

DJ.10.A.66-67



DJ.10.A.66-67

DJ.10.A.126-128



DJ.10.A.126-290

DJ.10.A.132-8

Archaeological artefacts from Sector A

The 2012-2015 seasons' preliminary catalogue

Romolo Loreto [1]
Marilena Polosa [2]

Introduction

This paper intends to proceed with the preliminary classification of the objects collected during the excavations in the historical core of Dûmat al-Jandal. Following the 2009-2011 catalogue, which included objects from Trench 1 and Trench 2,[3] here are listed the evidence from the enlargement of Trench 1 (2012-2015), the excavation of the industrial area to the east of Building A (2014, Trenches 3-6), and the soundings inside the courtyard of the Mârid Castle (2014-2015, Trenches 7-9).[4]

The preliminary catalogue, arranged by material categories, includes the whole recorded artefacts. A brief introduction to each category precedes the list of finds. Each item is classified using the excavation code. The most representative ones are shown in figures and preliminary discussed. Finally, further studies and restoration activities for each category of materials should take place both to implement our knowledge of the oasis life and to support the permanent exhibit of the new Archaeological and Ethnographical Museum of Dûmat al-Jandal.

1. University of Naples *L'Orientale*.
2. Archaeologist, University of Naples *L'Orientale*.
3. Loreto 2016c: 151.
4. Loreto *et al.* In press.

Main catalogue categories and further subdivision

1. Glass

1.1 Glass vessels
1.2 Vitreous paste jewelry

2. Metal

2.1 Silver
2.2 Bronze/copper alloy
- Jewelry and undefined plates

2.3 Iron
- Ferrite cores
- Working tools
- Undefined

3. Stone

3.1 Sandstone/limestone/basalt/schist/steatite
- Working tools
- Architectonic items
- Incense burner/altar
- Steatite vessels

3.2 Plaster
- Plugs and lids
- Architectonic items

3.4 Flint
3.5 Obsidian

4. Terracotta

- Incense burner
- Pipes
- Zoomorphic figurines
- Anthropic figurines

5. Textiles/leather

6. Others

- Zoological/botanical remains
- Resins and colored pastes

1. Glass

1.1 Vessels

During the 2012-2015 excavation seasons in the Sector A, several glass fragments were collected. Their state of preservation is generally fragmentary, i.e. not attributable to peculiar typological known types. Also, the different degrees of corrosion of the patina testify of glasses attributable to different periods, according to their stratigraphical contexts.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.12.A.O/4	Trench 1, L23 and L25 Collapse	1-3 cm	fragment	two fragments of glass
DJ.14.A.O/1	Trench 4, level 1	c.a. 0.1 cm	fragment	heavily damaged
DJ.14.A.O/9	Trench 4, level 2, NE M81		fragment	fragment of white glass
DJ.14.A.O/23	Trench 5, level 4, L35	length max.: 1 cm; width max.: 0.5 cm; thickness: 0.1 cm	fragment	fragment of white glass, shiny
DJ.14.A.O/37	Trench 7		fragment	fragment of white opaque glass; polygonal shape
DJ.15.A.O/02a-b	Extension North, Trench 1, level 3a	a: length: 0.6 cm, width: 1.1, thickness: 0.1 cm; b: length: 3.6 cm, width: 3.0 cm, thickness: 0.1 cm	fragment	a: fragment of white transparent wall; b: fragment of white opaque wall with probable traces of a wavelike pattern decoration on the outer surface
DJ.15.A.O/10	Extension N, Trench 1, level 2	length max.: 3.6 cm; length min.: 0.5 cm; width max.: 1.7 cm; width min.: 0.2 cm; thickness: 0.1 cm	fragment	fragment of white opaque wall with probable traces of a decoration or a kind of processing
DJ.15.A.O/37	Trench 8, level 3	length: 1.8 cm; width: 1.0 cm	fragment	fragment of white opaque glass
DJ.15.A.O/44	Trench 8, level 4	length: 3.7 cm; width: 0.5 cm	fragment	fragment of glass with bright green trace. A rim is partially preserved

DJ.15.A.O/57	Trench 8, level 4	length: 2.4 cm width: 1.7 cm thickness: 0.2 cm	fragment	fragment of glass wall, white color. Traces of white deposits are visible on both surfaces of the fragment
DJ.15.A.O/70	Trench 8, between level 4 and level 7	length: 1.2 cm thickness: 0.2 cm	fragment	fragment of glass wall with different shades of color and a glitter effect
DJ.15.A.O/88	Trench 8, level 7		fragment	wall with rounded edges in glass with various colors
DJ.15.A.O/99	Trench 9, level 2	length: 2.9 cm thickness: 0.4 cm	fragment	white glass bottle neck with everted rim
DJ.15.A.O/101	Trench 9, level 2		fragment	green glass leg of unidentified nature
DJ.15.A.O/105	Trench 9, level 1		fragment	fragment of transparent glass wall
DJ.15.A.O/108	Trench 9, level 2		fragment	fragment of yellow ocher color glass whose surface is slightly rounded
DJ.15.A.O/112	Extension N, Trench 1, level 3b, L48	length: 4.8 cm; width: 3.4 cm; thickness: 0.6 cm	fragment	glass wall with rounded profile and opaque white. Both surfaces are coated with a foil that has diverse colors
DJ.15.A.O/121	Trench 9, between level 2 and level 4	length: 2.6 cm; width: 2.3 cm; thickness: 0.5 cm	fragment	fragment of a wall, biconical profile, white opaque glass
DJ.15.A.0/122	Trench 9, level 2	length: 2.5 cm; width: 1.5 cm; thickness: 0.3 cm	fragment	fragment of a bottom, green glass. Visible traces of a whitish and brilliant coat on both surfaces
DJ.15.A.0/123	Trench 9, between level 2 and level 4	length: 3.0 cm; width max.: 3.3 cm; thickness: 1.1 cm	fragment	base and wall with different shades of color and brilliant tending to purple-blue. Visible vertical grooves along the outer surface of the wall

DJ.15.A.0/131	Trench 9, level 4	Ø: 5.2 cm; thickness: 0.6 cm	fragment	bottom, concave surface, in white opaque glass on which is visible a brilliant foil and various shades of color
DJ.15.A.0/144	Extension N, Trench 1, level 3b, between M34 e M35	length: 6.0 cm; width max.: 5.5 cm; thickness: 0.5 cm	fragment	glass wall of water green. Both surfaces have traces of a white foil

1.2 Vitreous paste jewelry

The vitreous paste bracelets are among the most abundant materials in the investigated areas, all of them specifically attributable to the Islamic periods. Their manifacture usually follows some basic schemes: polychromatic decorations (black, green, red, yellow, blue), round or triangular section, smoothed surface, tortile sometimes, presence of one or more horizontal bands or circular to semi-circular decorations.

Their distribution in the Arabian Peninsula is well documented,[5] nonetheless, a devoted study of their shapes and polychrome patterns could contribute to establish a chronological development of some peculiar fashions, useful for a relative chronology.

Only two items can be attribute to other classes: an oval bead comes from Trench 6; from the collapse of Building A in L9 was found a fragment of wall made of vitreous paste of which it retains the rim, interpreted as a miniaturist jar containing, probably, perfumes and/or ointments.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.12.A.O/6	Trench 1, collapse building A in L9	length: 2.0 cm; width: 1.6 cm; thickness: 0.1 cm	fragment	fragment of wall with rim of a vitreous paste vessel
DJ.12.A.O/7	Trench 1, M53	length: 7.5 cm	fragment	bracelet with different colors (black, light green, yellow) with a spiral decoration

5. Loreto 2016c: 154.

DJ.12.A.O/8	Trench 1, level 14	length: 6.5 cm	fragment	bracelet in polished black vitreous paste
DJ.14.A.O/25	Trench 5, surface	length: 3.5 cm	fragment	fragment of black bracelet with circular section. It has a polychromatic spiral decoration (red and yellow)
DJ.14.A.O/41	Trench 5	length: 4.5 cm	fragment	fragment of grey bracelet with triangular section
DJ.14.A.O/38	Trench 6	length: 1.0 cm	complete	oval bead, black-brown color
DJ.14.A.O/46	Trench 6	length: 4.0 cm	fragment	fragment of grey bracelet with circular section
DJ.14.A.O/49	Trench 6	length: 4.8 cm	fragment	fragment of bracelet in black circular section with a decorative pattern engraved into thin bands
DJ.14.A.O/63	Trench 3, L39	length: 5.0 cm	fragment	fragment of bracelet with circular section. The original black color is visible only in a portion of the bracelet
DJ.15.A.O/33	Trench 8, level 2	length: 3.8 cm; thickness: 0.9 cm	fragment	fragment of bracelet. The outer surface is decorated with three bands of different shades of color: the inner, in dark green, is purely decorative cordon, the outer two are light green in color

DJ.15.A.O/34	Trench 8, level 2	length: 1.4 cm; thickness: 0.4 cm	fragment	fragment of two-tone bracelet: the inner surface is black, while the outer is dark red. Two lines engraved on the outer surface
DJ.15.A.O/36	Trench 8, level of surface	length: 3.2 cm; thickness: 0.5 cm	fragment	fragment of bracelet in black vitreous paste. No decoration
DJ.15.A.O/60	Trench 8, level 4	length: 3.1 cm; width: 0.6 cm; thickness: 0.6 cm	fragment	fragment of black bracelet undecorated
DJ.15.A.O/91	Extension N, Trench 1, level 3b	width: 1.0 cm; thickness: 0.6 cm	fragment	fragment of a polychrome bracelet (green, yellow, red)
DJ.15.A.O/92	Extension N, Trench 1, level 3b	width: 0.8 cm; thickness: 0.6 cm	fragment	fragment of bracelet with two different color shades (light and dark green)
DJ.15.A.O/93	Extension N, Trench 1, level 3b	width: 0.9 cm; thickness: 0.7 cm	fragment	fragment of bracelet (black and light green)
DJ.15.A.O/102	Trench 9, level 2	length: / width: / thickness: /	fragment	blue bracelet with oblique bands engraved
DJ.15.A.O/103	Trench 9, level 2	length: / width: / thickness: /	fragment	bracelet decorated with horizontal bands of different colors: the two outer are white with black inclusion, while the center is opaque green
DJ.15.A.O/109	Trench 9, level 2	length: / width: / thickness: /	fragment	fragment of black bracelet with a hint of red. On surface slight horizontal streaks

DJ.15.A.O/127	Extension N, Trench 1, level 3b, L48, in close proximity to M97	length: 3.5 cm; thickness: 0.6 cm	fragment	fragment of bracelet with triangular section, polychrome paste (black, red, green and yellow)
DJ.15.A.O/141	Trench 8, level 2	length: 3.1 cm; width: 0.6 cm; thickness: 0.6 cm	fragment	fragment of bracelet in dark green and traces of opacification along surfaces
DJ.15.A.O/148	Extension N, Trench 1, level 3b, among M34 and M35	length: 3.3 cm; thickness: 0.6 cm	fragment	fragment of polychrome bracelet (black, red, yellow)
DJ.15.A.O/151	Extension N, Trench 1, level 3b, L14, in close proximity to M97, East side	length: 5.0 cm; thickness: 0.6 cm	fragment	polychrome bracelet (black, yellow, red, green). (cfr. DJ.15.A.O/127)

2. Metal

2.1 Silver

One silver fragment was found during the 2012-2015 excavations. It is a small plaque featuring an undefined relief decoration made of small dots, visible in **Fig. 1**, left side. It comes from Trench 7, level 3, among one of the mixed context of the courtyard of the Castle Mârid. Due to its thickness one can suggest the function as a circular decorated mirror.

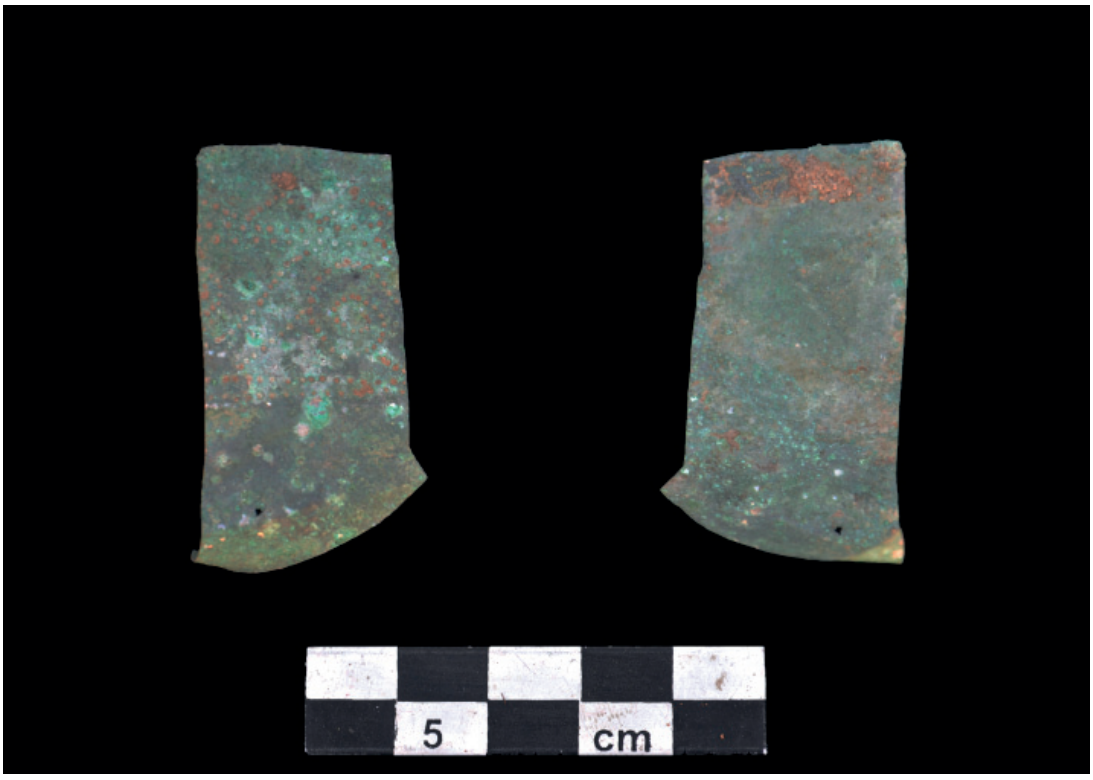


Fig. 1. Silver plaque from Trench 7

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.14.A.O/31	Trench 7, level 3	length: 4.7 cm; width: 2.2 cm; thickness: 0.1 cm	fragment	silver plaque with a decorative pattern made of spirals

2.2 Bronze/copper alloy

Jewelry and undefined plates

Among the bronze or copper alloy items, most of them are undefined objects, too fragmentary to reveal their function. However, some items can be defined as jewelry, such as pendants (DJ.12.AO/13; DJ.14.AO/11) or elements linked to clothing, especially brooches, buckles (DJ.12.AO/14; DJ.15.AO/135; DJ.15.AO/146), beads (DJ.14.AO/16; DJ.14.AO/29) and rings (DJ.13.AO/15c; DJ.14 .AO/44; DJ.15.AO/38; DJ.15.AO/42).

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.12.A.O/13	Trench 1, removal M11	length: 4.2 cm; width: 1.5 cm; thickness: 0.4 cm; Ø head: 1.5 cm	complete	pendant with round head and rectangular body
DJ.12.A.O/14	Trench 1, aeolian sand in L23	length rod: 2.0 cm; thickness rod: 0.1 cm	fragment	rod in bronze with relief decoration in the form of wire along the surface. Part of a brooch(?)
DJ.13.A.O/12	Trench 1, collapse of brick raw of M11, at the base of M70	Ø: 0.5 cm; thickness: 0.2 cm	fragment oxidized	fragment of oxidized bronze of spherical shape
DJ.13.A.O/13 a-e	Trench 1, collapse of brick raw of M11, at the base of M70	length max. a: 1.1 cm; length min. a: 0.6 cm; thickness a: 0.05 cm; length max. b: 1.5 cm; length min. b: 0.7 cm; thickness b: 0.07 cm; length max. c: 1.1 cm; length min. c: 0.7 cm; thickness c: 0.05 cm; length max. d: 0.8 cm; length min. d: 0.5 cm; thickness d: 0.07 cm; length max. e: 1.1 cm; length min. e: 0.3 cm; thickness e: 0.05 cm	fragment oxidized	fragment of oxidized bronze plate of different shape (rectangular, trapezoidal, rhomboidal, quadrangular). Two fragments (DJ.13.A.O/13b e DJ.13.A.O/13c) have a concave surface

DJ.13.A.O/14 a-b	Trench 1, between level 2, level collapse of brick raw of M11 and level 14, at the base of M70	length max. a: 2.6 cm; length min. a: 2.2 cm; width max. a: 1.0 cm; width min. a: 0.6 cm; thickness a: 0.05 cm; length max. b: 1.5 cm; length min. b: 1.3 cm; width max. b: 0.8 cm; width min. b: 0.7 cm; thickness b: 0.05 cm	fragment oxidized	fragment of oxidized bronze plate of different shape.
DJ.13.A.O/15 a-c	Trench 1, between level 2, level collapse of brick raw of M11 and level 14, at the base of M70	length max. a: 1.0 cm; length min. a: 0.6 cm; thickness a: 0.1 cm; length max. b: 1.8 cm; length min. b: 0.4 cm; thickness b: 0.05 cm; length c: 1.9 cm; thickness c: 0.05 cm	fragment oxidized	fragment of oxidized bronze plate of different shape. DJ.13.A.O/15a is a semi-circular plate. DJ.13.A.O/15b have a concave rectangular surface. DJ.13.A.O/15c is a semi-circular blade
DJ.13.A.O/17	Trench 1, level 14, M11	length max.: 3.5 cm; length min.: 3.2 cm; width max.: 0.8 cm; width min.: 0.6 cm; thickness: 0.1 cm	fragment oxidized	fragment of oxidized bronze item of rectangular shape
DJ.14.A.O/8	Trench 4, level 2, corner NE, intersection of M80 and M81	length: 4.2 cm; width: 3.3 cm	fragment oxidized	fragment of bronze plate whose surface has holes of various sizes
DJ.14.A.O/11	Trench 4, removal L31		fragment oxidized	three fragments of circular bronze pendant with a hole for the passage of a necklace wire. Traces of oxidation

DJ.14.A.O/16	Trench 4, corner N, removal L31		fragment oxidized	bronze wire characterized by small circular beads. There are traces of oxidation. In a fragment traces of tissue are visible
DJ.14.A.O/17	Trench 4, corner N, removal L31		fragment oxidized	two fragments
DJ.14.A.O/22	Trench 5, level 4	length max.: 1,8 cm; width max.: 0.9 cm; thickness: 0.2 cm	fragment, heavily incrusted and corrupted	fragment of bronze plaque with incrustations and oxidation
DJ.14.A.O/24a-d	Trench 5, level 4, L35	length max. a: 0.8 cm; width max. a: 0.5cm; thickness a: 0.1 cm; length max. b: 0.7 cm; width max. b: 0.5 cm; thickness b: 0.1cm; length max. c: 1 cm; width max. c: 0.3 cm; thickness c: 0.1cm length max. d: 0.6 cm; width max. d: 0.5 cm; thickness d: 0.1cm	fragment, heavily incrusted and corrupted	four fragment of bronze with oxidation
DJ.14.A.O/29	Trench 7, surface		complete oxidized	fragment, circular shape. Stud or bead(?)
DJ.14.A.O/42	Trench 6		fragment oxidized	bronze fragment with traces of oxidation
DJ.14.A.O/43	Trench 6	length: 2.0 cm; width: 0.6 cm; thickness: 0.1 cm	fragment oxidized	bronze fragment of concave shape with traces of oxidation
DJ.14.A.O/44	Trench 6		complete oxidized	ring (?)

DJ.14.A.O/47	Trench 6, removal level 2	length: 6.0 cm; width: 1.5 cm	fragment oxidized	fragment
DJ.14.A.O/48	Trench 6, removal level 2	length: 2.9 cm; width: 0.5 cm	fragment oxidized	two bronze clamps
DJ.14.A.O/50	Trench 6, removal level 2	length: 3.5 cm; width: 1.5 cm; Ø holes: 0.5 cm	fragment oxidized	bronze plate with five holes, two of which fragmentary
DJ.14.A.O/52	Trench 6, removal level 2		fragment oxidized	fragment
DJ.14.A.O/54	Trench 6, removal level 2		fragment oxidized	bronze plate folded on itself
DJ.14.A.O/56	Trench 6, level 5		fragment oxidized	bronze plate folded on itself
DJ.14.A.O/61	Trench 6, level 4	length: 1.2 cm; width nail head: 0.5 cm	complete oxidized	bronze nail (?) with traces of oxidation
DJ.14.A.O/62 a-b	Trench 6, removal level 3		fragment oxidized	two bronze fragments, one of which is folded on itself
DJ.15.A.O/21	Extension N, Trench 1, level 3a		fragment oxidized	five small fragments
DJ.15.A.O/38	Trench 8, level 3	thickness: 0.3 cm; Ø: 2.0 cm	complete oxidized	ring
DJ.15.A.O/42	Trench 8, level 4	thickness: 0.5 cm; Ø: 3.0 cm	complete oxidized	ring
DJ.15.A.O/59a-b	Trench 8, level 4	length a: 2.7 cm; width a: 1.5 cm; thickness a: 0.7 cm; length b: 1.7 cm; width b: 1.4 cm; thickness b: 0.2 cm	fragment oxidized	DJ.15.A.O/59a is a folded plaque DJ.15.A.O/59b is a thin plate of quadrangular shape

DJ.15.A.O/65	Trench 8, level 4	length: 3.6 cm; thickness: 0.2 cm	fragment oxidized	needle (?) curved
DJ.15.A.O/71	Trench 8, level 4	length: 4.2 cm; thickness: 0.9 cm	fragment oxidized	sharp point
DJ.15.A.O/84	Trench 8, level 9		fragment oxidized	fragment
DJ.15.A.O/107	Trench 9, level 2		fragment oxidized	small bronze foil
DJ.15.A.O/115	Extension N, Trench 1, level 3b, collapse near M34		fragment oxidized	spherical item
DJ.15.A.O/128	Extension N, Trench 1, level 30, L49		fragment oxidized	fragment
DJ.15.A.O/132	Trench 9, level 2		fragment oxidized	thin bronze foil
DJ.15.A.O/135	Extension N, Trench 1, level 3b, L48		fragment oxidized	fragment. On one side is visible an applied foil with a small hole, which would suggest to a fibula
DJ.15.A.O/139	Extension N, Trench 1, level 3b, L48	length: 4.9 cm; width: 2.0 cm; thickness: 0.4 cm	fragment oxidized	plaque
DJ.15.A.O/140	Extension N, Trench 1, level 31, L49		fragment oxidized	fragment
DJ.15.A.O/143	Extension N, Trench 1, L48-M7		fragment oxidized	fragment
DJ.15.A.O/146	Extension N, Trench 1, level 3b, between M34 and M35		fragment oxidized	hooks/fibula?
DJ.15.A.O/149	Extension N, Trench 1, level 31, L49		fragment oxidized	fragment

DJ.15.A.O/150	Extension N, Trench 1, level 3b, L14 in close proximity to M35	length: 3.5 cm; width: 2.0 cm; thickness: 0.5 cm	fragment oxidized	foil with two triangular flaps folded along one side
DJ.15.A.O/156	Extension N, Trench 1, level 3b		fragment oxidized	small bronze foil
DJ.15.A.O/161	Survey 5, cleaning L26	length: 3.6 cm; width: 3.2 cm; thickness: 0.3 cm	fragment oxidized	fragment of a bronze foil

2.3 Iron

Ferrite cores

The ferrite cores found in the Trench 1 testify to one of the industrial activities performed in the oasis. Several cores were found, usually the original ferrite stone still not separated from the metallic mineral, i.e. the processing from raw material to pure iron was achieved inside the oasis. The ferrite cores appear to be classified into two main types: first, for the extraction of iron (DJ.15.A.O/50, DJ.15.A.O/118, DJ.15.A.O/152, DJ.15.A.O/154); second, as cradle/mold for the production of bronze/copper alloy objects (DJ.15.A.O/8 e DJ.15.A.O/29).

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.13.A.O/27	Trench 1, level 1	length max.: 4.1 cm; length min.: 2.6 cm; thickness max.: 2.8 cm; thickness min.: 1.3 cm	fragment oxidized	block of compact rock, inside which the iron is clearly visible
DJ.13.A.O/30	Trench 1, level 28, at the base of M72	length max.: 10.0 cm; length min.: 7.5 cm; thickness max.: 3.6 cm; thickness min.: 1.7 cm	fragment oxidized	block of compact rock, inside which the iron is clearly visible
DJ.15.A.O/4	Extension N, Trench 1, level 3a	length max.: 8.5 cm	fragment oxidized	stone-ferrous (unfinished product) of irregular shape

DJ.15.A.O/5	Extension N, Trench 1, level 2	length max.: 6.6 cm; thickness max.: 2.2 cm	fragment oxidized	stone-ferrous (unfinished product), irregularly shaped, with traces of oxidation
DJ.15.A.O/7	Extension N, Trench 1, level 3a	length max.: 4.1 cm; thickness max.: 3.5 cm	fragment oxidized	stone-ferrous (unfinished product), irregularly shaped
DJ.15.A.O/8	Extension N, Trench 1, level 3a	length max.: 4.0 cm; thickness max.: 1.9 cm	fragment oxidized	stone-ferrous (unfinished product), irregularly shaped, with traces of oxidized bronze
DJ.15.A.O/9	Extension N, Trench 1, level 3a	length max.: 3.3 cm	fragment oxidized	red stone-ferrous (unfinished product), irregularly shaped
DJ.15.A.O/12	Extension N, Trench 1, level 3a	length max.: 5.2 cm; thickness max.: 2.5 cm	fragment oxidized	stone-ferrous irregularly shaped, with traces of oxidation
DJ.15.A.O/13	Extension N, Trench 1, level 3a	length max.: 10.2 cm; thickness max.: 6.0 cm	fragment oxidized	stone-ferrous (unfinished product), irregularly shaped, with traces of oxidation
DJ.15.A.O/19	Extension N, Trench 1, level 3a	length max.: 4.5 cm; thickness max.: 1.6 cm	fragment oxidized	stone-ferrous, irregularly shaped, with traces of oxidation
DJ.15.A.O/20	Extension N, Trench 1, level 3a	length max.: 4.4 cm; thickness max.: 2.7 cm	fragment oxidized	stone-ferrous, irregularly shaped, with traces of oxidation
DJ.15.A.O/22	Extension N, Trench 1, level 3a	length max.: 6.0 cm; thickness max.: 3.6 cm	fragment oxidized	stone-ferrous (unfinished product), irregularly shaped, with traces of oxidation

DJ.15.A.O/23	Extension N, Trench 1, level 3a	length max.: 10.9 cm; thickness max.: 5.1 cm	fragment oxidized	stone-ferrous (unfinished product), irregularly shaped, with traces of oxidation
DJ.15.A.O/29	Extension N, Trench 1, level 3a	length: 4.7 cm; width: 3.1 cm; thickness: 1.3 cm	fragment oxidized	stone-ferrous with oxidized bronze
DJ.15.A.O/30	Extension N, Trench 1, level 3a	length: 8.2 cm; width: 6.9 cm; thickness: 6.5 cm	fragment oxidized	stone-ferrous with traces of oxidation
DJ.15.A.O/50	Extension N, Trench 1, level 3a	length: 5.0 cm; width: 3.7 cm; thickness: 3.3 cm	fragment oxidized	stone-ferrous of irregular shape with traces of oxidation
DJ.15.A.O/80	Extension N, Trench 1, level 3b		fragment oxidized	stone-ferrous with traces of oxidation
DJ.15.A.O/118	Extension N, Trench 1, level 3b, L48	length: 8.9 cm; width max.: 7.9 cm; thickness: 3.3 cm	fragment oxidized	stone-ferrous with traces of oxidation
DJ.15.A.O/152	Extension N, Trench 1, level 3b, L14, intersection between M34 and M97	length: 4.2 cm; width: 3.3 cm; thickness: 3.4 cm	fragment oxidized	stone-ferrous with traces of oxidation
DJ.15.A.O/154	Extension N, Trench 1, level 3b, L14	length: 4.9 cm; width: 5.3 cm; thickness: 2.3 cm	fragment oxidized	stone-ferrous with traces of oxidation

Working tools

Some items clearly related to functional purposes were recorded, such as the iron nails (DJ.12.A.O/3, DJ.13.A.O/31, DJ.14.A.O/26, DJ.15.A.O/41, DJ.15.A.O/68).

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.12.A.O/3	Trench 1, removal M11	length max.: 3.0 cm; length min.: 1.5 cm; Ø: 0.7 cm	fragment oxidized	three fragments oxidized. Nail (?)
DJ.13.A.O/31	Trench 1, level 27, at the base of M58	length: 5.9 cm; width: 1.0 cm; thickness: 0.7 cm	fragment oxidized	fragment of elongated circular shape. Nail (?)
DJ.14.A.O/26	Trench 7, surface	length: 4.0 cm; width: 0.8 cm	fragment oxidized	fragment of curved shape. Nail (?)
DJ.15.A.O/6	Extension N, Trench 1, level 2	length max.: 1.2 cm; width max.: 0.5 cm	fragment oxidized	working discard of irregular shape with traces of oxidation
DJ.15.A.O/16	Extension N, Trench 1, level 3a	length: 15.5 cm; width max.: 7.3 cm; width min.: 3.6 cm; thickness max.: 3.0 cm; thickness min.: 1.3 cm	fragment oxidized	triangular axe with tapered for grip. It presents traces of oxidation
DJ.15.A.O/41	Trench 8, level 4	length: 3.6 cm; thickness: 1.1 cm	fragment oxidized	iron point oxidized with stripes over the time. Probably a nail
DJ.15.A.O/68	Trench 8, level 7	length: 3.8 cm; thickness: 0.6 cm	fragment oxidized	iron nail with traces of oxidation

Undefined

The fragmentary status of the following items does not allow a proper identification.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.13.A.O/11	Trench 1, level 14, East limit	length: 1.0 cm; width: 0.6 cm; thickness: 0.1 cm	fragment oxidized	iron plate
DJ.13.A.O/18	Trench 1, level 14, East limit	thickness max.: 0.7 cm; thickness min.: 0.02 cm; Ø: 3.6 cm	complete oxidized	iron fragment with traces of oxidation and various wear grooves along the surface
DJ.14.A.O/6	Trench 4, level 2, N	length: from 0.01 to 1.0 cm	fragment oxidized	four fragments
DJ.14.A.O/33	Trench 7, level 3	length: from 1.5 to 2.5 cm	fragment oxidized	two fragments
DJ.14.A.O/45	Trench 6	length: 1.0 cm	fragment oxidized	small iron fragment with traces of oxidation
DJ.15.A.O/1a-d	Extension N, Trench 1, level 2	length max. a: 2.3 cm; length max. b: 1.0 cm; length max. c: 0.7 cm; length max. d: 0.6 cm	fragment oxidized	1a: iron fragment with traces of oxidation; 1b: working discard with traces of oxidation; 1c: working discard with traces of oxidation; 1d: iron fragment with traces of oxidation

DJ.15.A.O/63a-c	Trench 8, level 4	length a: 6.0 cm; width a: 1.6 cm; thickness a: 0.9 cm length b: 2.6 cm; width b: 1.3 cm; thickness b: 0.6 cm length c: 1.5 cm; width c: 1.2 cm; thickness c: 0.3 cm	fragment oxidized	three iron fragments
DJ.15.A.O/110	Trench 9, level 2	length: 2.0 cm	fragment oxidized	small iron fragment with traces of oxidation and various wear grooves along the surface

3. Stone

3.1 Sandstone/limestone/basalt/schist/steatite

Working tools

The working tools in sandstone, limestone, basalt and schist reveal other aspects of the production activities performed in the oasis (**Figs. 2 and 3**). The working tools are divided into:

mortars (DJ.12.A.O/20a). Mortars usually have circular or elongated shape;

pestles (circular, spherical, oval, quadrangular or irregular) (DJ.12.A.O/20b; DJ.13.A.O/22; DJ.14.A.O/3; DJ.14.A.O/13; DJ.15.A.O/25; DJ.15.A.O/31; DJ.15.A.O/47; DJ.15.A.O/55; DJ.15.A.O/75; DJ.15.A.O/77; DJ.15.A.O/78; DJ.15.A.O/142);

grindstones characterized by two wheels fixed by a central pivot. The upper wheel is mobile and used for the crushing and grinding (DJ.13.A.O/16; DJ.15.A.O/27; DJ.15.A.O/62);

whetstones, usually with an oval or elongated shape, testify to the presence of objects or blades to be sharpened for different purposes (DJ.14.A.O/35, DJ.15.A.O/25, DJ.15.A.O/119);

varia. One item (DJ.14.A.O/60), among many undefined, is a limestone tool with crescent shape (sickle?) found in level 8 (L41) in Trench 6.

Fig. 2. Examples of grindstone, mortar and pestle from the area of Dûmat al Jandal

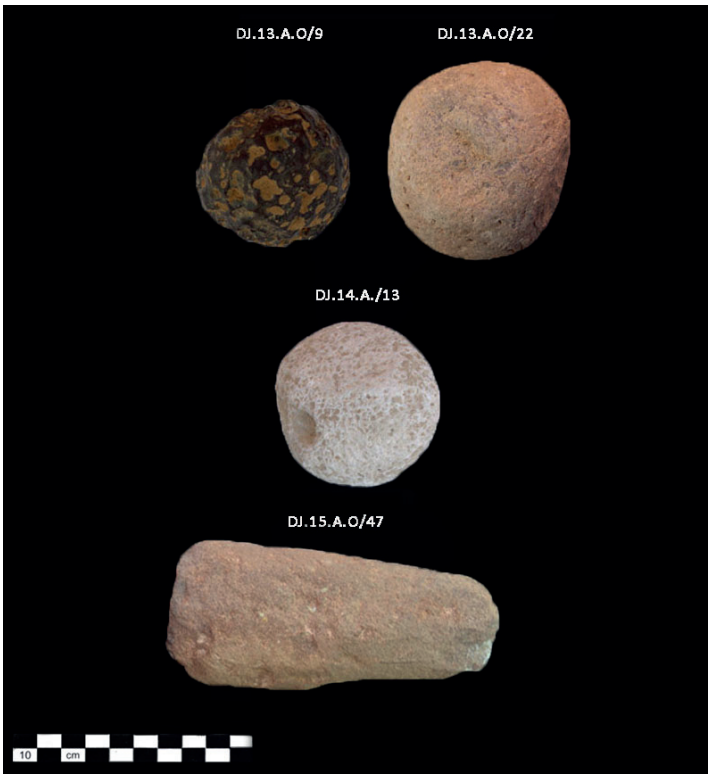


Fig. 3. Examples of pestle with different shape from the area of Dûmat al Jandal

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.12.A.O/20a-b	Trench 1, level 3b		a: partially preserved; b: complete	yellow sandstone mortar. Part of the basin is preserved (DJ.12.A.O/20a). It is accompanied by a circular pestle (DJ.12.A.O/20b)
DJ.13.A.O/16	Trench 1, level 14, at the base of M14	length max.: 13.2 cm; length min.: 12 cm; width max.: 13.3 cm; width min.: 5.6 cm; thickness max.: 4.3 cm; thickness min.: 1.5 cm	fragment	grindstone fragment with a rough surface. The oval pivot hole is visible
DJ.13.A.O/22	Trench 1, level 27, North limit, at the base of M11	Ø: 6.1 cm	complete	spherical pestle in yellow sandstone
DJ.14.A.O/3	Trench 4, between level 1 and level 2, corner N	Ø: 10.7 cm; thickness: 4.5 cm	complete	pestle of irregular shape. The lower surface is flat and smooth. Traces of burning are visible along the surface

DJ.14.A.O/13	Trench 4, removal L31	Ø: 6.2 cm; height: 6.3 cm	complete	circular pestle with a flat and smooth lower surface
DJ.14.A.O/35	Trench 7, level 3	length: 15.0 cm; width: 9.7 cm; thickness: 4.1 cm	complete	object of oval shape with irregular surface and traces of burn along the edge. Whetstone or pestle (?)
DJ.14.A.O/60	Trench 6, level 8, L41	length: 10.2 cm; width: 6.1 cm; thickness: 2.1 cm	complete	tool, in limestone, with crescent shape
DJ.15.A.O/25	Extension N, Trench 1, level 3a	length: 8.7 cm; width: 7.2 cm; thickness: 6.5 cm	partially preserved	oval pestle
DJ.15.A.O/27	Extension N, Trench 1, level 3a	length: 4.9 cm; width: 1.9 cm; thickness: 4.6 cm	fragment	fragment of small grindstone (?)
DJ.15.A.O/31	Extension N, Trench 1, level 3a	length: 14.2 cm; width: 7.0 cm; thickness: 4.7 cm	complete	grey sandstone pestle with traces of working along the surface
DJ.15.A.O/47	Extension N, Trench 1, level 3a	length: 13.6 cm; width max.: 5.9 cm; thickness: 4.7 cm	partially preserved	grey sandstone pestle with two long sides tapered upward and flat basis
DJ.15.A.O/55	Trench 8, level 4	length: 8.0 cm; width: 3.1 cm; thickness: 4.7 cm	fragment	sandstone pestle with quadrangular basis and smooth surface
DJ.15.A.O/62	Trench 8, level 4	length: 18.1 cm; width: 16.2 cm; thickness: 3.0 cm	partially preserved	elliptical grindstone
DJ.15.A.O/75	Extension N, Trench 1, level 3a	length: 6.8 cm; width: 4.3 cm; thickness: 4.6 cm	fragment	grey sandstone pestle
DJ.15.A.O/77	Extension N, Trench 1, level 3b	length: 8.9 cm; width: 3.5 cm; thickness: 4.3 cm	complete	grey sandstone pestle

DJ.15.A.O/78	Extension N, Trench 1, level 3b	length: 8.3 cm; width: 4.7 cm; thickness: 4.0 cm	complete	grey sandstone pestle
DJ.15.A.O/119	Extension N, Trench 1, level 3b, L48	length: 9.6 cm; width: 7.8 cm; thickness: 3.8 cm	complete	oval whetstone in grey sandstone
DJ.15.A.O/142	Extension N, Trench 1, level 3b, L48	length: 9.0 cm; width: 6.0 cm; thickness: 5.6 cm	complete	grey sandstone pestle
DJ.13.A.O/9	Trench 1, level 3a, at the base of M69	Ø: 5.2 cm	complete	circular pestle in vacuolar basalt with a smooth surface (surface of working)
DJ.15.A.O/25	Extension N, Trench 1, level 3a	h max.: 3.9 cm; length max.: 7.1 cm; width max.: 5.4 cm	fragment	whetstone, in black-gray schist, with flat truncated cone shape and beveled edge

Architectonic items

The architectonic items are usually represented by pivot hinge associated to the Islamic architecture and still visible in the historical area around the 'Umar mosque. Their shape is sub-circular and flat, with rough surfaces and a wooden post hole in the middle.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.13.A.O/1	Trench 1, level 3a, near M10	length max.: 18.5 cm; length min.: 10.0 cm; width max.: 10.9 cm; width min.: 8.6 cm; thickness max.: 5.6 cm; thickness max.: 3.4 cm	partially preserved	pivot hinge. Semi-circular shape.
DJ.13.A.O/2	Trench 1, level 1 (surface)	length max.: 13.1 cm; length min.: 10.0 cm; width max.: 7.2 cm; width min.: 4.1 cm; thickness max.: 4.1 cm; thickness max.: 1.5 cm	fragment	pivot hinge. Semi-circular shape.

DJ.13.A.O/3	Trench 1, level 1 (surface)	length max.: 11.7 cm; length min.: 10.1 cm; width max.: 8.1 cm; width min.: 6.0 cm; thickness max.: 4.6 cm; thickness max.: 2.6 cm	partially preserved	pivot hinge. Semicircular shape.
DJ.13.A.O/8	Trench 1, level 2, southern border	length max.: 16.7 cm; length min.: 12.0 cm; width max.: 13.2 cm; width min.: 9.6 cm; thickness max.: 5.9 cm; thickness max.: 4.0 cm	fragment	pivot hinge. Semicircular shape.
DJ.13.A.O/19	Trench 1, level 14, eastern border	length max.: 13.6 cm; length min.: 5.5 cm; width max.: 11.2 cm; width min.: 6.4 cm; thickness max.: 5.1 cm; thickness max.: 4.6 cm	partially preserved	pivot hinge. Semicircular shape.
DJ.13.A.O/20	Trench 1, level 14, eastern border	length: 11.5 cm; width: 10.0 cm; thickness max.: 6.2 cm; thickness max.: 2.0 cm	fragment	pivot hinge. Semicircular shape.
DJ.13.A.O/21	Trench 1, level 27, south-eastern border	length: 10.4 cm; width: 8.8 cm; thickness max.: 5.0 cm; thickness max.: 4.0 cm	fragment	pivot hinge. Semicircular shape.
DJ.14.A.O/36	Trench 7	length: 11.8 cm; width: 10.8 cm; thickness max.: 5.0 cm; thickness max.: 2.0 cm	complete	pivot hinge. Semicircular shape.
DJ.15.A.O/28	Extension N, Trench 1, level 3a	length: 10.0 cm; width: 8.8 cm; thickness: 4.3 cm	partially preserved	pivot hinge. Semicircular shape.
DJ.15.A.O/96	Extension N, Trench 1, level 3b	length: 10.0 cm; width: 8.8 cm; thickness: 4.3 cm	complete	oval pivot hinge with depression on both surface

Incense burner/altar

Two items attributable to the incense burner category or an altar/cultic sphere can be identified, both in stone: one in sandstone and one in basalt. These items still preserved a foot and part of the basin (**Figs. 4 and 5**). Their attribution to a pre-Islamic period could be asserted by looking at the Islamic incense burner collected, made of terracotta, as comparisons testified (see below). Also, DJ.12.A.O/1 comes from a stratigraphic context clearly related to the Nabataean period.

Fig. 4. Examples of incense burner or tripod in sandstone

Fig. 5. Tripod or basin, in basalt, from level 21

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.15.A.O/158	Survey 5, level 10, L26, S M62	Length foot: 7.8 cm; width foot: 3.1 cm; thickness foot: 4.9 cm; length basin: 7.0 cm; width basin: 4.0 cm	fragment	fragment of a foot and basin of incense burner
DJ.12.A.O/1	Trench 1, level 21, collapse building A	h: 13.4 cm; width max: 8.3 cm; h foot: 5.3 cm; width foot: 6.4 cm	fragment	part of tripod or basin with a square foot, bottom edge, vertical outer wall and shallow pool (cfr. DJ.15.A.O/158)

Steatite vessels

Steatite is a material widely used with a very long periodization. Mainly jars or large vessels for daily food processing were collected in Sector A, as well as mortars. Considering the whole collected materials, from 2009 to 2019, steatite appears distributed from the Nabataean to the Islamic periods.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.15.A.O/120	Trench 9, between level 2 and level 4	length: 11.5 cm; width max.: 7.0 cm; thickness: 1.0 cm	fragment	wall and bottom. Traces of bronze repair are visible on the surface. Cfr. DJ.10.A.O/
DJ.15.A.O/137	Extension N, Trench 1, level 3a	length: 6.1 cm; width: 5.2 cm; thickness: 2.1 cm	fragment	mortar with hem and bottom

3.2 Plaster

Plugs and lids

Different plaster items, mainly plugs and lids, and few architectonic decorations emerged. One can distinguish the waterproof plaster (*ṭin or qaḍâḍ*) usually found *in situ* as cover of floors or walls whose usage is ascribable to tanks, from a simple white plaster used to plug jars or to define architectonic decorations (see below).

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.13.A.O/4	Trench 1, level 2, at the base of M14	length max.: 9.5 cm; length min.: 6.9 cm; thickness max.: 2.6 cm; thickness min.: 0.8 cm	fragment	plug
DJ.13.A.O/5	Trench 1, level 2, southern border	length max.: 7.8 cm; length min.: 5.8 cm; thickness max.: 1.7 cm; thickness min.: 0.9 cm	fragment	plug
DJ.13.A.O/6	Trench 1, level 3a, south-western border	length max.: 9.2 cm; length min.: 6.9 cm; thickness max.: 2.6 cm; thickness min.: 0.8 cm	fragment	plug
DJ.13.A.O/7	Trench 1, level 2, southern border	length max.: 7.9 cm; length min: 4.4 cm; width max.: 6.9 cm; width min.: 3.8 cm; thickness max.: 4.4 cm; thickness min.: 2.6 cm	fragment	plug
DJ.13.A.O/24	Trench 1, level 1	length: 4.7 cm; width max.: 3.3 cm; width min.: 1.5 cm; thickness max.: 2.3 cm; thickness min.: 2.0 cm	fragment	plug
DJ.13.A.O/25	Trench 1, level 1	length max.: 4.6 cm; length min.: 3.3 cm; width max.: 4.5 cm; width min.: 2.3 cm; thickness max.: 3.0 cm; thickness min.: 1.5 cm	fragment	plug
DJ.13.A.O/28	Trench 1, level 28, at the base of M72	length max.: 8.6 cm; length min.: 5.6 cm; width max.: 4.8 cm; width min.: 2.6 cm; thickness max.: 7.1 cm; thickness min.: 1.8 cm	fragment	plug
DJ.13.A.O/29	Trench 1, level 28, at the base of M72	length max.: 4.7 cm; length min.: 2.4 cm; width max..: 2.5 cm; width min.: 1.1 cm; thickness max.: 1.9 cm; thickness min.: 0.5 cm	fragment	plug

DJ.14.A.O/5	Trench 4, level 2	length max.: 3.2 cm; length min.: 1.5 cm; width max.: 4.0cm; width min.: 2.0 cm	fragment	lid
DJ.14.A.O/39a-b	Trench 7	length a: 10.0 cm; width a: 7.8 cm; thickness a: 5.1 cm; length b: 7.4cm; width b: 6.0 cm; thickness b: 3.5 cm;	fragment	lid

Architectonic items

Only two architectonic items were found during the 2012-2015 excavations (**Fig. 6**). Usually they show a well defined geometric feature and an irregular back surface resulting from the application of the plaster on a wall or to a wooden element.

Fig. 6. Plaster architectonic items from level 1 in Trench 1 and level 2 in Trench 9

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.13.A.O/26	Trench 1, level 1	length max.: 4.3 cm; length min.: 1.4 cm; width max.: 4.0 cm; width min.: 0.7 cm; thickness max.: 2.5 cm; thickness min.: 0.8 cm	fragment	fragment of a geometric architectonic decoration
DJ.15.A.O/125	Trench 9, level 2	length: 6.4 cm; width max: 5.0 cm; thickness: 4.4 cm	fragment	fragment of a geometric architectonic decoration

3.4 Flint

Despite the historical context, several flint tools (mainly blades) were recorded from Trench 1 (even more were also recorded from the excavation in Sector B, close to the 'Umar mosque - report forthcoming). One could suggest that these items, collected from Nabataean to Islamic domestic contexts, are the result of a conscious "collector". These items are related to the Neolithic assemblages from the hunter-gatherers sites of Asfân.[6]

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.14.A.O/2	Trench 4, between level 1 and level 2, corner N	length: 3.4 cm; width max: 2.5 cm; width min.: 1.5 cm	fragment	fragment of broken flint. One end presents touches on one side; likely scrapers made from the remnants of a nucleus. Dating from the 6th/4th millennium BC
DJ.15.A.O/35	Trench 8, level 1 (surface)	length: 2.3 cm; width: 1.6 cm	fairly good	flint arrowhead with peduncle and two fins

6. Aurino & Loreto 2016: 37-64.

DJ.15.A.O/56	Trench 8, level 4	length: 2.6 cm; width: 1.5 cm; thickness: 0.6 cm	good	flint blade of which the machining detach along the outer surface are visible. Internally it presents a well-polished surface
DJ.15.A.O/69	Trench 8, level 7	length: 1.9 cm; width max.: 1.4 cm; thickness: 0.3 cm	fragment	flint blade with tapered shape upward. One of the two faces present longitudinal cuts with denticles edges, while the other is smooth
DJ.15.A.O/104	Trench 9, level 1	length: 3.9 cm; width: 2.4 cm; thickness: 0.6 cm	fragment	flint blade with carved face and denticles edges, while the other is smooth

3.5 Obsidian

Two obsidian items were collected from the surface of the Mârid castle courtyard (Trench 7 and 9), probably fragments of the same object (miniaturistic lid).

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.14.A.O/28	Trench 7, level 1 (surface)	length: 2.5 cm; width: 1.5 cm; thickness: 0.6 cm	fragment	miniaturist cover in obsidian (cfr. DJ.15.A.O/126)
DJ.15.A.O/126	Trench 9, level 2	length: 1.0 cm; width: 1.0 cm; thickness: 0.6 cm	fragment	miniaturist cover in obsidian with traces of incrustation on the outer surface (cfr. DJ.14.A.O/28)

4. Terracotta

Among the most abundant materials in the oasis, terracotta shows several types of objects: incense burners, pipes, zoomorphic and anthropomorphic figurines, and others. What follows is a preliminary list of objects, mainly the most significant ones from a chronological point of view.

Incense burners

All the terracotta incense burners seem to be dated to the Islamic periods, according to their decorative patterns (**Fig. 7**). From a morphological point of view, one notices a predominance of quadrangular (rectangular and/or square) shapes, characterized by four low feet and a shallow basin. This typology, classified as C1 type by Le Maguer,[7] has geometric decoration, usually engraved and/or graffiti (triangles, circles, vertical grids, horizontal or oblique, etc.). This type is also considered the oldest and the first developed in the Islamic world and is dated to between the VI-VIII centuries C.E.[8]

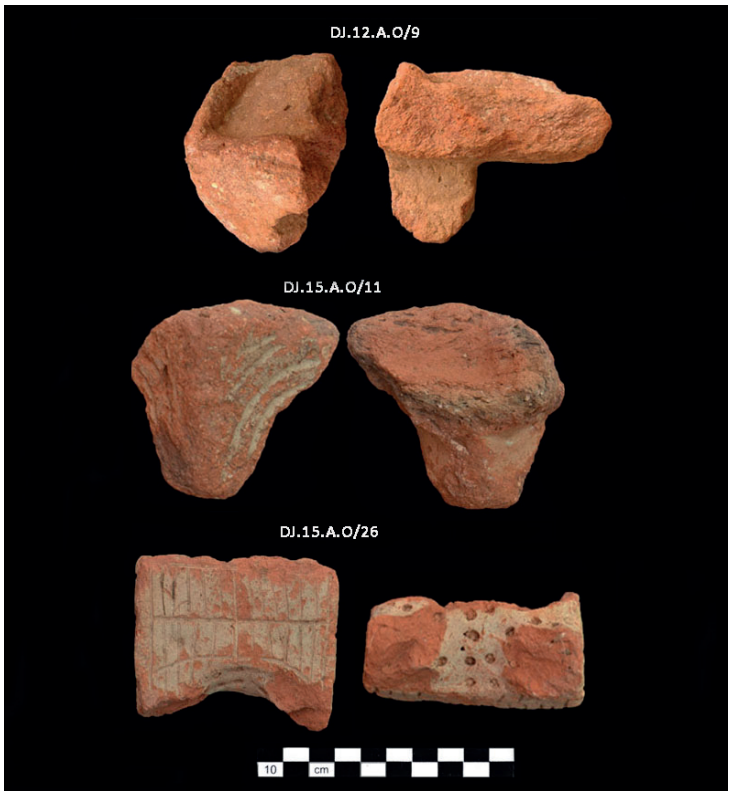


Fig. 7. Examples of incense burner from Islamic Period of Trench 1

7. Le Maguer 2011: 174-175.
8. *Ibidem.*

Based on the typological and decorative diversification that incense burners will take in the course of Islam, with an ever greater peculiarity in forms and decorations,[9] the so-called "Syria's incense burners" seem to resemble the specimens found in Dûmat al-Jandal. Up to now, the main comparisons come from the Siro-Palestinian area;[10] Mesopotamian and Elamite regions;[11] sites in the Arabian area (particularly the southern and easter regions).[12]

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.12.A.O/9	Trench 1, level 3b, L9	h: 5.7 cm; width: 6.4 cm; h foot: 2.8 cm; base of the foot: 2.5 cm	fragment	part of incense burner with quadrangular foot, small rim, vertical wall and shallow basin
DJ.15.A.O/11	Extension N, Trench 1, level 3a	length max.: 6.0 cm; length min.: 3.3 cm; width max.: 6.1; width min.: 2.1 cm	fragment	fragment of incense burner. A foot and part of the body preserved. Decorated with an incised motif of curvilinear bands.
DJ.15.A.O/18	Extension N, Trench 1, level 3a	h max.: 3.2 cm; length max.: 5.7 cm; pool thickness: 2.4 cm; h foot: 1.1 cm	fairly good	fragment of incense burner. Four feet preserved and part of the body decorated with circular impression.
DJ.15.A.O/26	Extension N, Trench 1, level 3a	h max.: 5.9 cm; length: 8.1 cm; thickness max.: 3.8 cm; pool length: 5.3 cm; h feet: 1.3 cm	fairly good	fragment of a rectangular incense burner. The surface has a white slip coating decorated with incised lines in shape of a grid. The bottom surface is decorated by circular impressions

9. Le Maguer 2011: 176-178.

10. Rahmani 1980: plate 13; Le Maguer 2011: 174-175.

11. BM 1930,1213.343 (http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=388996&partId=1&searchText=incense+burner&object=22115&material=17980|17669&page=1).

12. BM 130542 (http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?asetId=1132033001&objectId=1551831&partId=1).

BM 130543 (http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?searchText=icense%20burner&object=22115&material=17980|17669&ILINK|34484,|assetId=1132035001&objectId=389547&partId=1).

DJ.15.A.O/46	Extension N, Trench 1, level 3a	length max.: 5.5 cm; width: 4.3 cm; thickness max.: 5.1 cm	fragment	fragment of incense burner
DJ.15.A.O/147	Extension N, Trench 1, level 3a, between M34 and M35	length: 5.0 cm; width: 7.0 cm; thickness: 3.7 cm	fragment	part of incense burner. Two feet preserved. Fire traces inside the bowl

Pipes

Five fragments of terracotta decorated pipes, generally dated to the Late Ottoman period,[13] were found in Sector A.[14] Most recent comparisons, from the Arabian Peninsula, come from al-Kharj.[15] This lot (**Fig. 8**) implements a corpus that is growing each season, waiting for a devoted study.

Fig. 8. Examples of Ottoman pipe

13. Simpson 2008.
14. Loreto 2016c: 180-182.
15. Schiettecatte & al-Ghazzi 2016: 200.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.14.A.O/51	Trench 6, level 2	length: 6.0 cm; width: 4.5 cm; Ø: 1.5 cm	fragment	fragment of terra-cotta pipe, shank for wooden stem preserved
DJ.15.A.O/17	Extension N, Trench 1, level 3a	h: 2.0 cm; length: 2.4 cm; width: 2.5 cm; thickness: 0.5 cm	fragment	fragment of terra-cotta pipe, shank and bowl pre-served. The bowl is decorated by impressed vertical lines. The shank is decorated with a thin incised band. Abundant com-bustion traces.
DJ.15.A.O/40	Trench 8, level 4	length: 3.9 cm; thickness: 1.7 cm; thickness mouthpiece: 1.9 cm	fragment	fragment of undecorated terracotta pipe
DJ.15.A.O/54	Trench 8, level 3	length: 3.4 cm; width: 3.2 cm; thickness: 0.8 cm	fragment	fragment of terracotta pipe (bowl). The decorative pattern of the bowl includes two registers: the upper one has four thin bands in relief, the lower one two floral motifs
DJ.15.A.O/76	Extension N, Trench 1, level 2	length: 2.6 cm; Ø bowl: 1.5 cm	fragment	fragment of terracotta pipe decorated with lines engraved on the outer surface of the bowl

Zoomorphic figurines

The zoomorphic figurines from Sector A include mainly camels or horses, in a red-orange fabric that can be associated to the wide attested "fabric 2", a local fabric. Also, the figurines are sometimes covered with a white thin slip. Decorative patterns comprise dots, oblique or vertical lines, notches or palmette-like models. This lot is going to implement a rich *corpus* of zoomorphic figurines dated to between the Nabataean period and the Islamic periods, and whose function should be related to both sacral nature or household activities (toys) (**Fig. 9**).

Fig. 9. Some zoomorphic figurines from Dûmat al-Jandal

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.12.A.O/11	Survey 4, level 9	length: 8.3 cm; Ø trunk: 2.4 cm	fragment	part of leg and body of quadruped (dromedary or horse?)
DJ.12.A.O/15	Survey 4, level 10	length: 9.7 cm; width: 6.9 cm; thickness: 3.5 cm	fragment	part of a camel. The hump is marked by notches and a single band on what could be the final part of the neck
DJ.12.A.O/16	Survey 4, rock	length: 7.7 cm; width: 4.0 cm; thickness: 3.0 cm	fragment	dromedary female head with elongated profile
DJ.12.A.O/17	Survey 4, level 10	length: 5.5 cm; width max.: 5.2 cm	fragment	part of a body (dromedary or horse?)
DJ.12.A.O/18	Survey 4, level 10	length: 6.3 cm; Ø: 2.3 cm	fragment	dromedary head with white slip coating and eyes slightly sketchy
DJ.12.A.O/19	Survey 4, level 10	length: 6.5 cm	fragment	part of a body, probably a horse
DJ.14.A.O/40	Trench 7	length: 8.0 cm; width: 5.4 cm; thickness: 3.7 cm	fragment	bovine (?) head characterized by a very pronounced nose and right eye with a circular shape
DJ.15.A.O/14	Extension N, Trench 1, level 3a	h max.: 5.5 cm; h min.: 4.7 cm; length max.: 5.1 cm; length min.: 3.1 cm; width max.: 3.5 cm; width min.: 3.2 cm		fragment of legs, neck and hump (probably dromedary)
DJ.15.A.O/24	Extension N, Trench 1, level 3a	length: 4.4 cm; thickness: 2.7 cm	fragment	fragment of clay figurine unidentified
DJ.15.A.O/51	Extension N, Trench 1, level 3a	length: 4.6 cm; width: 2.2 cm; thickness: 2.2 cm	fragment	quadruped neck. Visible the presence of a decoration engraved as harness

DJ.15.A.O/90	Extension N, Trench 1, level 3b	length: 7.8 cm; width: 4.6 cm; thickness: 4.0 cm	fragment	leg of quadruped
DJ.15.A.O/136	Extension N, Trench 1, level 30, L49, in close proximity of M7	length: 5.3 cm; width: 3.8 cm; thickness: 2.9 cm	fragment	fragment
DJ.15.A.O/159	Survey 5, level 10	thickness: 3.6 cm	fragment	fragment of legs of quadruped
DJ.15.A.O/160	Survey 5, level 10	length: 5.3 cm; width: 3.8 cm; thickness: 2.9 cm	fragment	several fragments: ears, neck and part of the back and legs

Anthropomorphic figurines

A female figurine was found in Sector A, from level 2 (aeolian late stratigraphic unit) in Extension N of Trench 1.[16] It is a head of female figurines with traces of clay slip coating which preserves the face and the neck (**Fig. 10**).

Fig. 10. Female head from level 2 in Trench 1

16. See Loreto *et al*. in this volume.

This female head (DJ.15.A.O/3) seems to find comparisons in the statuettes found in the archaeological site of Thâj, dated to a period between the III cent. BCE – III cent. CE.[17] The elongated rendering of the eyes that seem almost almond[18] and jewels, in particular the necklace, characterized by a double row of dots that appear to represent pearls,[19] seem to testify a common Hellenistic style.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.15.A.O/3	Extension N, Trench 1, level 2	length: 4.0 cm; width max.: 2.3 cm; width min: 1.5 cm; thickness max.: 1.5 cm; thickness min.: 1.1 cm; length face: 1.8 cm; width face: 1.5 cm; length neck: 1.2 cm; width neck: 2.0 cm	fragment	head of female figure with traces of clay slip coating. The head seems to be covered by a veil that follows the outlines of the neck, leaving that leaves the face uncovered. Almond eyes under thin eyebrows of which only the left one is visible; the remaining physiognomic features such as the nose, mouth and chin are not preserved. At the very elongated neck a dotted decoration pattern suggest a necklace

17. Hashim 1991: 5.
18. Hashim 1991: plate 9, nr. 3.
19. Hashim 1991: plate 8, nr. 3.

5. Textiles/leather

From the Islamic stratigraphic units of Trench 1, although in the mixed levels (levels 1 to 4) several textiles and leather items were collected. Their restoration should implement the ethnographical exhibition of the local Museum.

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.15.A.O/130	Extension N, Trench 1, level 3b, L48, in close proximity of M97		fragment	several fragments of interlock knit fabric in light brown
DJ.15.A.O/153	Extension N, Trench 1, level 3b, L14, in close proximity of M34, east side		fragment	interlock knit fabric fragment in dark brown
DJ.15.A.O/157	Extension N, Trench 1, level 3b		fragment	interlock knit brown fabric fragment with red stitching
DJ.15.A.O/111	Trench 9, level 2	length: 9.2 cm; width: 4.2 cm; thickness: 1.0 cm	fragment	part of leather shoe
DJ.15.A.O/129	Extension N, Trench 1, level 3b, L48		fragment	leather shoe/leg or a jacket/belt

6. Others

Zoological/botanical remains

Waiting for a detailed examination of the collected soil samples, up to now macro zoological and botanical remains comprise ostrich eggs fragments, dates, ropes and shells (**Fig. 11**).

Fig. 11. Shells from Trench 1

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.12.A.O/2	Trench 1, level 21, collapse building A	length a: 4.0 cm; width a: 2.5 cm; length b: 3.0 cm; width b: 2.0 cm	fragment	two fragments of ostrich egg
DJ.12.A.O/5	Trench 1, collapse L23 and L25	length a: 4.0 cm; length b: 1.0 cm	fragment	two fragments of ostrich egg
DJ.14.A.O/27	Trench 7, surface	length a: 1.3 cm; length b: 0.8 cm	fragment	two fragments of ostrich egg

DJ.14.A.O/34	Trench 7, level 3	length: 4.0 cm	fragment	fragment of ostrich egg
DJ.14.A.O/57	Trench 6, level 5	length: 3.0 cm	fragment	fragment of ostrich egg
DJ.15.A.O/67	Trench 8, level 7	length: 2.0 cm; width max.: 2.2 cm; thickness: 0.2 cm	fragment	fragment of ostrich egg
DJ.15.A.O/79	Extension N, Trench 1, level 2	length: 2.0 cm	fragment	fragment of ostrich egg
DJ.15.A.O/124	Trench 9, level 2	length: 1.5 cm	fragment	fragment of ostrich egg with traces of white incrustation
DJ.14.A.O/4	Trench 4, level 2, North-east corner	length a: 1.0 cm; length b: 1.0 cm; length c: 1.5 cm; length d: 2.0 cm; length e: 2.0 cm; length f: 1.5 cm; length g: 2.0 cm	complete	seven seeds of date. One shows traces of burning
DJ.14.A.O/12	Trench 4, removal L31	length: 1.5 cm	complete	seed of date
DJ.14.A.O/14	Trench 4, removal L31	length a: 2.5 cm; length b: 2.0 cm; length c: 1.0 cm	complete	three seeds of date
DJ.14.A.O/15	Trench 4, removal L31	length: 7.0 cm	fragment	ropes
DJ.14.A.O/18	Trench 4, removal L31, North corner	length a: 2.5 cm; length b: 2.5 cm	complete	two seeds of date with burning traces
DJ.14.A.O/20	Trench 4, South corner	length a: 0.8 cm; length b: 0.8 cm; length c: 0.8 cm	complete	three seeds (?)
DJ.14.A.O/21	Trench 4, South corner	length a: 0.8 cm; length b: 0.8 cm; length c: 0.8 cm; length d: 0.8 cm; length e: 0.8 cm; length f: 0.8 cm; length g: 0.8 cm	complete	seven seeds (?)

DJ.14.A.O/53	Trench 6, removal level 2	length: 1.5 cm	complete	seed of date (?)
DJ.14.A.O/55	Trench 6, level 5	length: 6.0 cm	fragment	ropes
DJ.14.A.O/58	Trench 6, level 8, L41	length: 2.5 cm	fragment	seed of date with burning traces
DJ.14.A.O/59	Trench 6, level 8, L41	length: 4.5 cm	fragment	ropes
DJ.15.A.O/72	Trench 8, level 4	length: 1.8 cm; thickness: 0.8 cm	complete	seed of date
DJ.15.A.O/83	Trench 8, level 7	length: 2.5 cm	complete	seed of date
DJ.13.A.O/10	Trench 1, level 3a, at the base of M69	length max.: 4.2 cm; length min.: 1.8 cm; width max.: 3.5 cm; width min.: 0.4 cm; length spire: 2.0 cm; width spire: 2.7 cm; length neck: 1.9 cm; width neck: 0.4 cm; length last ring: 2.9 cm	fairly good	Turritella Turris, shell that belongs to the family of gastropods.
DJ.13.A.O/23	Trench 1, level 27, at the base of M58	length: 4.7 cm; width: 2.2 cm; thickness max.: 0.1 cm; thickness min.: 0.05 cm	fragment	concave nacre shell with elongated shape

Resins and colored pastes

Two peculiar items come from Trench 8 (Mârid Castle courtyard), an amber bead and a light blue colored paste fragment (turquoise), both collected from a stratigraphic context heavily damaged (**Fig. 12**).[20]

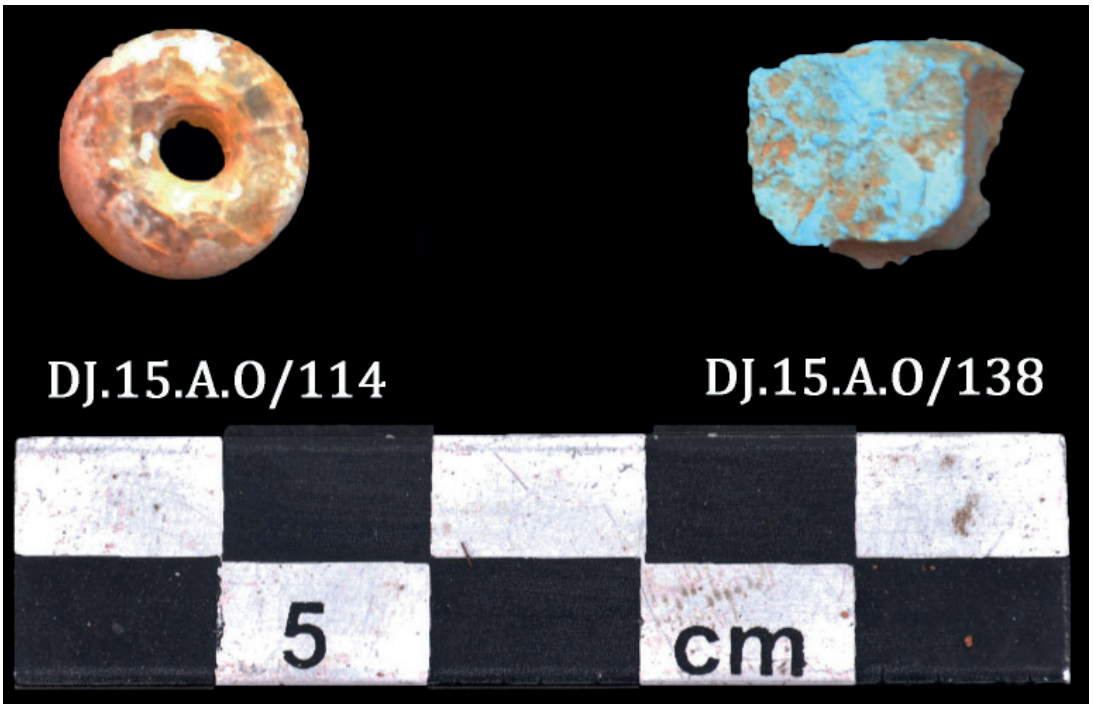


Fig. 12. Amber necklace grain and light blue colored paste from Trench 8 in Mârid Castle

Excavation number	Provenance	Dimensions	State of preservation	Description
DJ.15.A.O/114	Trench 8	thickness: 0.6 cm; Ø: 0.3 cm	complete	amber bead
DJ.15.A.O/138	Trench 8, level 2	length: 1.0 cm	fragment	fragment of light blue colored turquoise paste

20. See Loreto & Cocozza in this volume.

The Western Settlement, Sector C

Guillaume Charloux, Charlène Bouchaud, Marianne Cotty, Thamer al-Malki, Céline Marquaire, Romain Mensan, Ronald Schwerdtner & Dara'an al-Qahtani

The archaeological and geoarchaeological studies carried out in March 2016 in the fortified western sector of the oasis focused both on the nature of the oasis settlement in the valley and on traces of pre- or protohistoric activities on the promontory. Examination of the area (which covers 40 ha) since 2010 has led to the completion of 36 soundings dug over six seasons.

The last season was particularly intense, with 13 soundings being opened. Due to the heavy silting up of the area, especially on the northern flank of unit 8 at the base of the promontory (soundings R. Mensan), the use of a mechanical shovel in the lower part of the sector made it possible to open eleven geoarchaeological soundings there. The aim was to understand and date the location of ancient settlements. The work was divided into two areas:

1. The area below unit 8 of the western enclosure, forming the northern slope bordering the depression, where we opened soundings 24, 27, 28, 29, 32, 33, 34, 35 and 36.

2. The central depression of the valley, where we opened soundings 25 and 30.

These two areas have sedimentary fills that are very distinct from on another and contained archaeological remains that are equally different. The sedimentation on the northern slope of unit 8 consists exclusively of aeolian sand, which can cover structures up to 5.50 m high (Soundings 24 and 33). More specifically, we can see alternating phases of filling, of aeolian sand and debris from the demolition of unit 8 of the enclosure. The archaeological remains are difficult to characterise and not all have been dated, but it is clear that there are areas of occupation very close to the current surface as well as remains buried under 4 or 5 m of sand. It is absolutely essential to be able to date the remains found in order to compare them and model the process of the covering of the slope. The sedimentation in the depression is very different: there is little or no aeolian sand and a high proportion of infilling can be identified in the upper parts of the profiles (soundings 30 and sounding 25). Above the water table, alternating sands create rather alluvial profiles or are sands linked to the agricultural activities in this sector. Indeed, the only features observed are long walls uninterrupted by perpendicular structures. These structures are systematically flush with the surface in soundings 25, 30 and 17. They are probably not dwellings, but more likely structures linked to hydraulic or agricultural development.

At the same time, research on the promontory focused on the excavation of a large stone structure on the south side of the promontory, which began last season (sounding 18, M. Cotty and C. Marquaire). Seven soundings revealed a complex platform of course dry-stone masonry, 35 m long and trapezoidal in shape. It has two niches on its eastern façade.

This platform is filled with a core of small rubble and sand. Although material traces are almost non-existent, a few human bones were found in the fill. The 2016 season enabled the excavation to be completed, the layout of the building to be understood and three construction phases to be identified, although the phases of occupation are more difficult to determine.

We were reminded of the difficulty of identifying structures by remote sensing or simple surface surveys during the excavation, this season, of a small sounding at the eastern end of the promontory's upper terrace (sounding 26, A. Chevalier & T. al-Maliki). Identified first as a tower and then a tomb, the excavation uncovered the four sides of a square structure, empty inside, so, very probably a tower after all. A few sherds were recovered from the inner fill.

The tomb (sounding 31) excavated by A. Chevalier, assisted by Th. Al-Maliki, on the east side of the promontory's upper terrace, was unfortunately severely disturbed by recent looting, as were the other pre- and protohistoric remains in the region. Despite the fact that the entire structure had been completely dismantled and that there were no longer any remains in situ, the sieving nevertheless yielded an impressive quantity of carnelian and shell beads. There was also the surprise discovery of an Egyptian-style scarab.

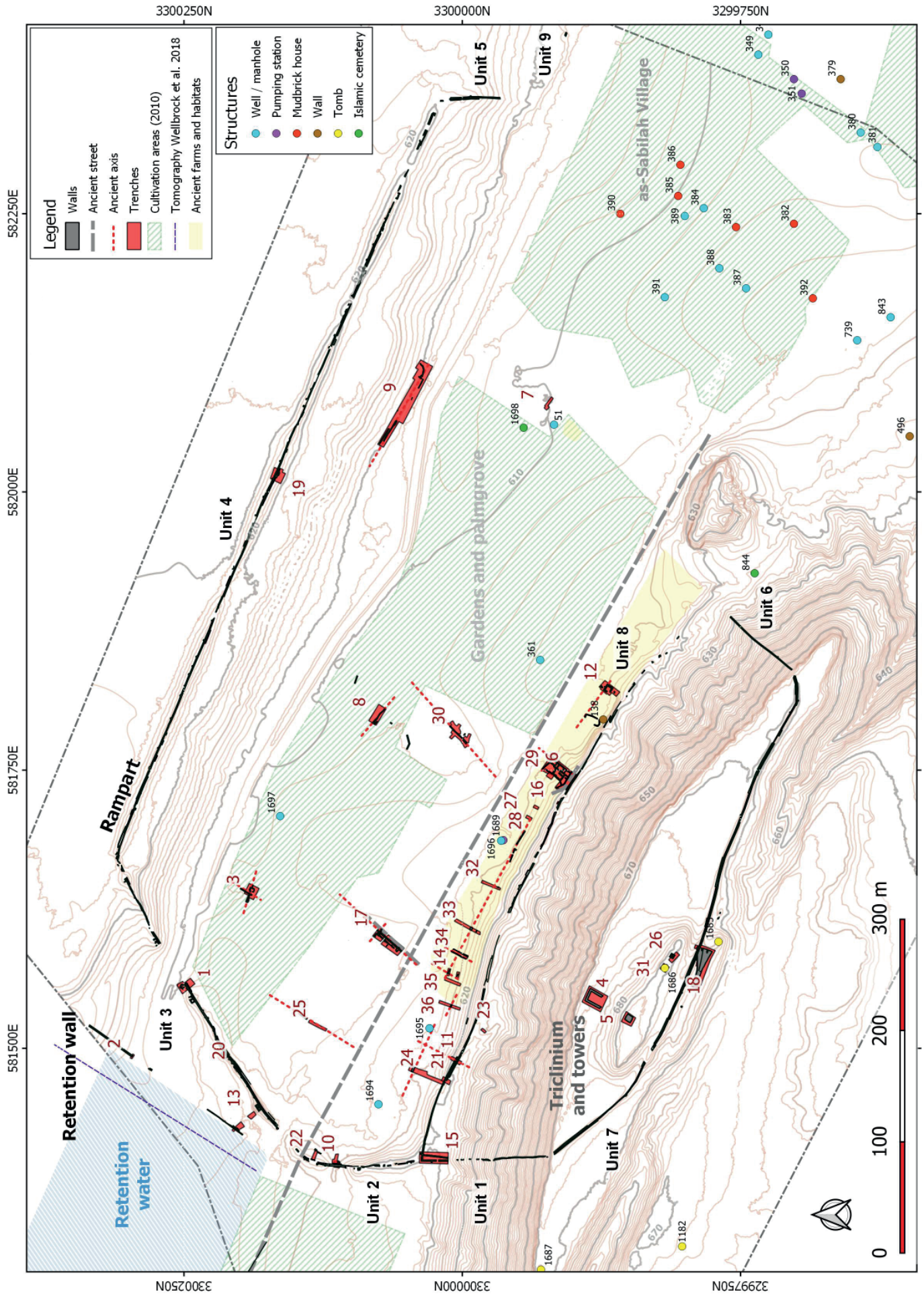
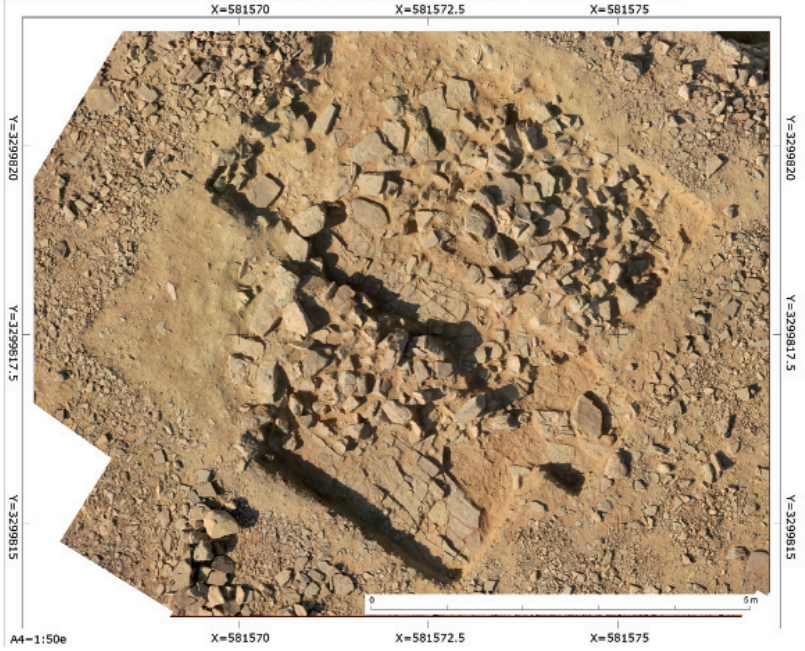


Fig. 1. Plan of the western settlement at Dûmat al-Jandal (sector C)



Figs. 2 & 3. Sounding 31 and artefacts found during the excavations

Sounding 18.
The Rijm el-Burj platform

Marianne Cotty [1]
Céline Marquaire [2]

Introduction

The 'Rijm el Burj' promontory is 650 m long and rises to 100 m. Its summit consists of two terraces: a large one (altitude: 670–675 m) and a small hill in its centre (altitude: 680–684 m). Its northern, eastern and western flanks are particularly steep, so access was likely from the south. The «Rijm el Burj» whose name means 'the ruin of the tower', includes several archaeological structures, including a Nabataean triclinium - an open-air building meant for hosting banquets and ceremonies. This is a strong piece of evidence suggesting that the promontory was a place of ritual buildings.[3] The discovery of a tower from the 4th-5th century A.D. and a square building nearby,[4] whose function was linked to the enclosure (unit 7), also indicates that the Burj was well-positioned for such structures in general.[5]

Surveys have also identified burial structures and undetermined features on the promontory (**Fig. 1**). One of them, located at the southern part of the main terrace, particularly attracted our attention because a looting hole was identified in 2013. In it, we have found the facing of a wall as well as a large assemblage of human bones and a carnelian bead. In 2015, we decided to carry out surveys at this location in order to understand the structure named L2200 (Fig. 2).[6] Subsequently, seven soundings revealed a complex building executed in dry stone with a crude apparatus. It was 35 m long and trapezoidal in shape, with two steps on its eastern facade. A mix of rubble and sand fully blocks this platform.

1. Archaeologist, Louvre Museum, AO.
2. PhD student at Université Paris I – Panthéon-Sorbonne.
3. Charloux *et al*. 2016: 13–34.
4. In 2011, a second tower in the same east-west alignment has been identified and excavated in 2016 by A. Chevalier (SD26).
5. Charloux *et al.* 2016.
6. Cotty *et al. Dûma 5* (Forthcoming): 244-253. A synthesis paper about this platform was published recently in *Antiquity* (Munoz *et al.* 2020).

Although the material remains are almost non-existent, some human bones have been discovered in this blockage. The 2016 campaign made it possible to complete the excavation, understand the plan of this building and identify the three phases of its construction, while the individual phases of its occupation were more difficult to determine. Below, we describe the different archaeological preliminary phases recognized during the two excavation campaigns (**Fig. 2**).

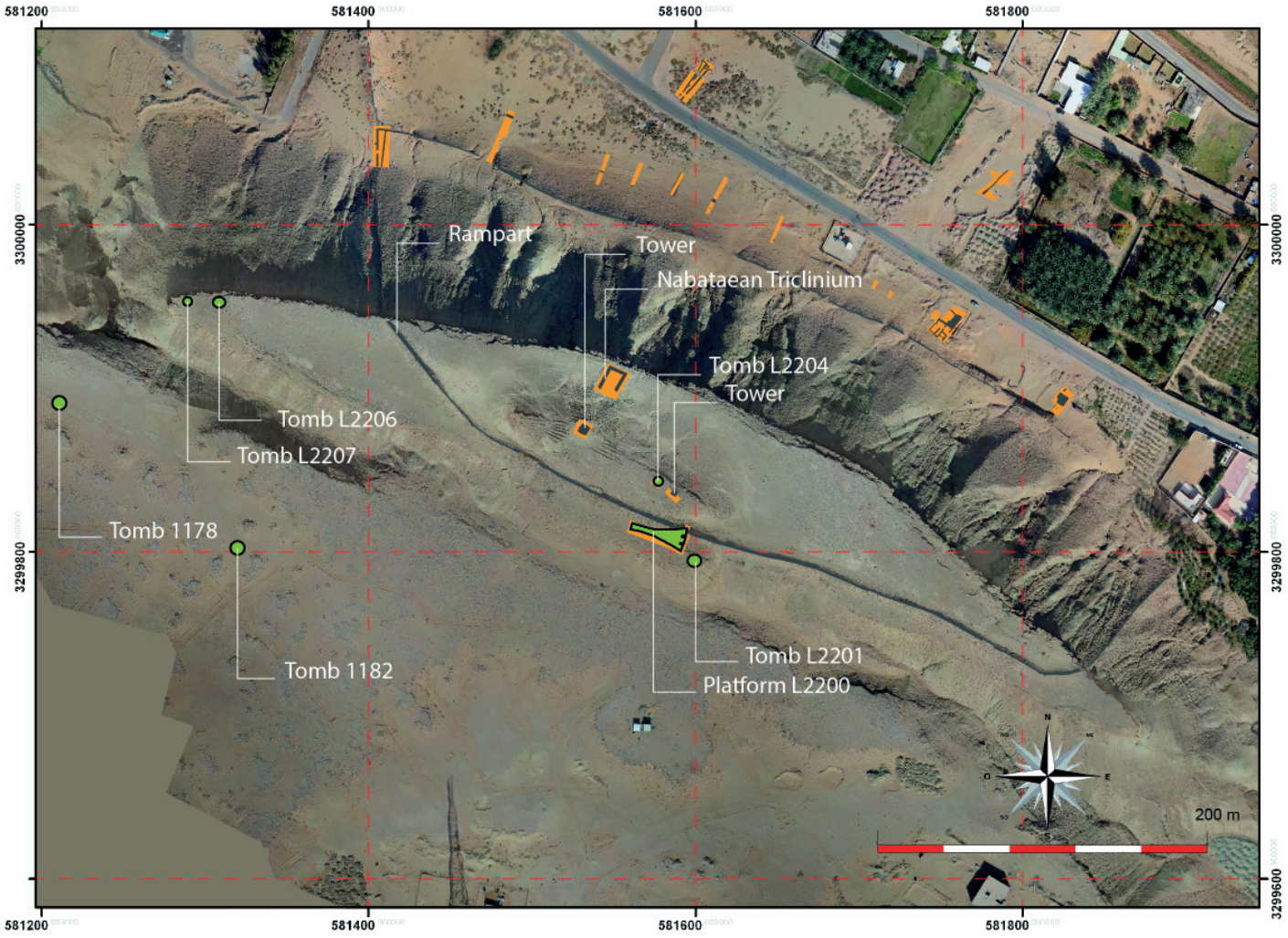


Fig. 1. Orthophotograph of the promontory in Sector C, with main identified archaeological remains

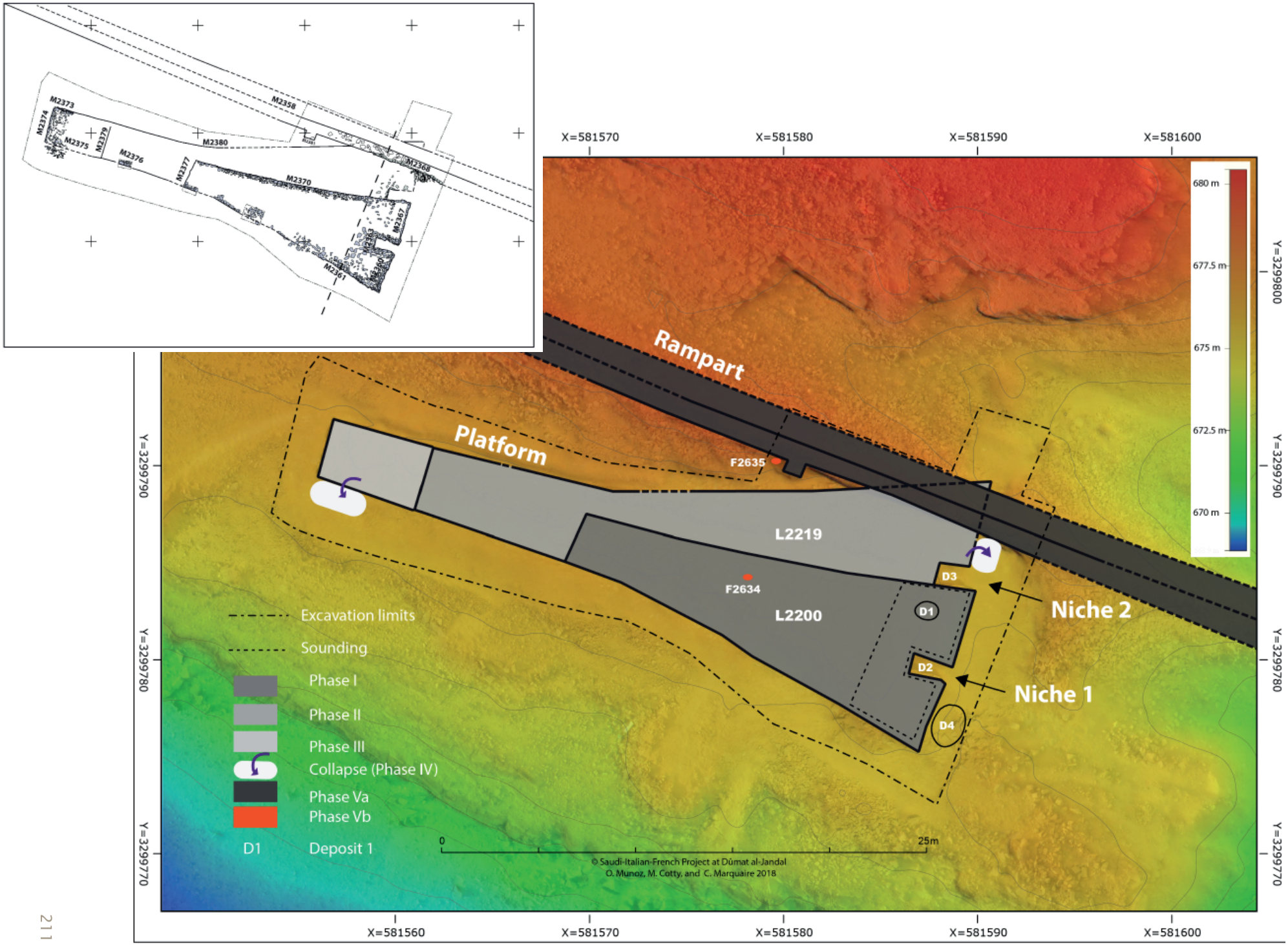


Fig. 2. Plan and DTM of the platform on the promontory in Sector C

Phase 1

The first phase concerns the main structure called L2200. The M2370 wall, 21 m long, oriented east-west, is preserved over 15 courses and reaches up to 675.90 m. The eastern facade consists of walls M2367 and M2360 and a step L2217. The M2360 wall, preserved up to 78 cm high, was partially destroyed by looters, who dug a hole outside the structure three meters in diameter.[7] The M2367 wall is heavily levelled and is only preserved at its foundation. This eastern facade rests on the rock and, in places, on a very hard white substrate (US2619: marl-limestone formation).

The L2217 step is made up of the walls M2365-M2363 and M2364, and oblong in shape (max. length of M2365 and M2364: 2.20 m; width of M2363: 1 m). The M2364 and M2365 walls are preserved over six courses. In their lower parts, we found white limestone rubble with large nodules and blackish slabs of smaller modules arranged horizontally in the upper parts. The M2363 wall, made up of 10 courses, also includes two lintels, the purpose of which is perhaps also ornamental. The walls of step L2217 also rest on US2619.

The M2361 wall (21 m long) is preserved in its eastern part over 11 courses in the south. Large blocks (US 2601) were placed to the south of M2361 in order to retain this wall. It rests directly on the rock at an altitude of 674.83 m.

The M2384 wall, which formed the return between M2361 and M2370, seems to have disappeared to the west. The survey pit (SD 5) only revealed slabs collapsed at the ridges at an altitude of 675.70 m. Therefore, it is assumed that the building of Phase 1 stopped at this point, where the M2370 wall ends (**Fig. 3**). Following the destruction of M2384, a westward extension was made. This is Phase 2 = L2219.

In 2015, a survey (SD1) in the eastern part of L2200 helped us understand its internal organization better. It is a solid structure filled with irregular stones mixed with orange-brown compact sand (US2603). This infill rests on US 2618, a loose level of orange-brown sand with blocks of stone. Subsequently, these two levels are based on a whitish indurated sediment (US 2619). This backfill, probably intended to level the bedrock, was also observed outside the building (US 2623).

On the surface of the structure (alt. 676,153 m and 676,187 m), the remains of a hearth (L2634) were found at the US2618 infill. Only heated sand remained from this hearth, attesting to the human activity on the platform. Moreover, in the SD1 sounding in the heart of the platform, we discovered human remains at two places in the blockage (US 2608, bag A44356 and US 2617, altitude: 675.50 m). The dating of the bones from US 2608 (bag A44356 [8]) points at the end of the 5th millennium B.C. - an exceptional date for the oasis, as its prehistoric eras are mainly known through rock art and lithic industries.

7. Cotty *et al.* Forthcoming *Dûma 5*: 241, fig. 2.

8. Prepared by O. Trombet (Labex BCDiv, UMR 7209) and A. Zazzo (CNRS UMR 7209) at the Radiocarbon laboratory of the MNHN, Paris. Graphitisation and AMS measurements were performed using the ARTEMIS facility at Gif-sur-Yvette (France).

Fig. 3. Building of phase 1 with the end of the wall M2370 view from the west (DJ20160023b)

The human remains at L2200

We did not recognize any excavation limit, nor any particular layout or dip of the filling stones that would hint at a later deposit in the internal filling of the structure. The bone remains were crushed by the blocks of stones under which they rested. Their poor state of preservation and powdery consistency made their excavation and collection difficult. The identification of the remains, when possible, was carried out on-site because the remains fragmented during the collection, making any subsequent identification impossible. We recognized several long bones (US 2608) represented only by portions of the diaphysis whose cortical surface was highly altered (femur and radius, as well as three portions of indeterminate diaphyses). The long bones were bundled together and laid out flat without any anatomical connection being noticed. The maximum preserved length of the diaphyses is 25 cm. Some long bones showed axial deformations, as they had been crushed by the stones and sediment above. This suggests that they contained collagen when buried because otherwise, completely dry bones would have fractured straight away. Several other fragments were associated with this deposit: a fragment of an indeterminate long bone shaft, preserved over 10 cm, a fragment of the skull cap about 10 cm in diameter, as well as a fragment of a femur head, a fragment of a vertebral arch, and a fragment of a cuneiform (tarsus).

On the same level, at about 10 cm, a marine gastropod shell with a perforated apex and a shell pearl were found (O.2608-1).

Further north, other fragments of long bones and the altered remains of a hip bone were also found, lying horizontally in association with some fragments of a goat tooth (US 2617).

These observations suggest one or more intentional deposits of bones, which must have been already dislocated but not fully mineralized, at a time when the L2200 structure was not fully filled in. The poor state of preservation of the human remains has limited their further identification; At least one individual is represented, and the bones correspond to a skeleton of adult size. However, the absence of the ends of the long bones leaves us ignorant as to the state of synostosis: We can, therefore, only say that at least one individual over 15 years old is represented.

The presence of additional material remains in the same area as the bones suggests perhaps a deposit for funerary purposes, although the details remain unknown.

The fill of steps L2217

Different layers of sediment filled the L2217 step: US2606, US2613, US2615, US2616, US2620 (**Fig. 4**) and US2622. The sandy sediments had been sealed off by collapsed stone blocks (US2613). US2616 (top at 675.05 m) is a level of burnt sand and stone with pockets of ash and charcoal (P.2616). Fortunately, a piece of tamarisk charcoal proved solid for C14 dating.

The results [9] also point at a date around the middle of the 6th millennium B.C. This layer contained burned and unburned gastropods of the Melanopsidae family and gravels with a smooth and shiny surface.[10] We also observed sherds of mica and some faunal remains. US 2613, 2615 and 2616 delivered 25 fragments of bovines and one fragment from an ovicaprid (see Monchot Duma 2015, pp.). Further studies should be carried out to determine if these were domesticated species. Lithic specimens [11] were found in the fill of the step: US2616 yielded burnt cutting debris. Other evidence suggests that the lithic artefacts found here originate from the cleaning of an area, as the materials are heterogeneous and seem displaced. A chalcedony fragment of good quality has also been identified.

Moreover, two bone pins (O.2606-1 and O.2615-1) were found at an altitude of 674.93 m. Subsequently, beneath fragments of flat-laid boulders lies US2620: a loose sandy level that is more organic than the one above, containing mainly pupae remains and silt pellets. At the bottom, four stones were stuck in the white substrate (US2623), possibly indicating a post-hole.

9. UBA-32224. UBA laboratory.

10. It is possible that these gravel and gastropods were attached to freshwater plants from the oasis that would have been brought into L2217 (pers. comm. with Jacques Élie Brochier (Université Aix-Marseille, CNRS). Pers. comm. Y. Hilbert: these gravels with a smooth and shiny surface might be perhaps gastroliths.

11. Pers. comm. Y. Hilbert.

Fig. 4. Top view of locus L2217

It is noteworthy that the C14 date obtained from the tamarisk charcoal (US 2616) in the L2217 fill is slightly earlier than that of the bone from within the platform blockage (US2608). We can assume that the date obtained from US 2608 (late 5th mill. B.C.) marks a deposit after the construction of the platform. This may otherwise be explained by the "old wood effect" of the tamarisk sample (US2616) (meaning that the original wood is not necessarily contemporary with the period of its use).

Phase 2

During the second phase of construction, the structure L2219 was added to the north and west of the L2200 core. To the south, the M2376 wall is an extension of the M2361 wall. The M2379 wall, 3.40 m long, joins the M2380 north wall. Although the wall tie is not visible, we observe that M2379 is indeed linked to M2376 and M2380. The latter is a wall, 29 m long, and slightly curvilinear. Despite some minor gaps, the particularly well-preserved wall M2380 was not damaged by the "Nabataen-Roman" enclosure (Unit 7, M2368) built above. Therefore, the northern corner of this extension (M2383) appears on the other side of the enclosure. Only a part of the base is preserved and rests at 675.83 m (**Fig. 5**).

The eastern facade of L2219 is also made up of a step (L2218). All that remains of the M2372 wall are piled and collapsed stones (US2629), which probably correspond to the wall's collapse.

The step L2218 step consists of the M2371 wall, strongly levelled to the east (altitude: 674.40 m). This wall is tied with wall M2369 and preserved over 14 courses (H.: 0.70 m).

The construction technique used is similar to that of Phase 1: a dry stone apparatus, with limestone rubble (of 20 x 25 cm modules) in the lower part and greyish slabs in the upper part (**Fig. 6**). The M2369 wall rests against the M2370 wall. The absence of a wall tie between these clearly indicates that L2219 is a later addition to the L2200 structure.

The walls of locus L2219 rest, as in Phase 1, on a white indurated substrate (US 2623) at 675.29 m. However, we have not hit bedrock during any of our research activities.

Like the monument in Phase 1, the external facings of M2369-M2371 and M2372 retain a blockage of irregular rubble and blocks from 0.20 to 0.30 m long. This very dense infill (US2630), comprised of aeolian sand, leans against M2370. It is covered with a more indurated level US 2628 of green marl mixed with small whitish pebbles.

The eastern facade of L2219 was designed and built with a concern for symmetry similar to that of L2200. The three walls, M2360, M2367 and M2372/M2383, measure between 3.80 and 4.50 m. Logically, the two steps are placed at an equal distance from the southern and northern angles of the platform. Although added later, step L2218 is the identical counterpart of L2217. They are both 2 m² in size. The mixed brickwork of M2363 and M2369 is very similar. Both of these walls possess the same mechanical and aesthetic characteristics with an alternation of grey and white limestones.

Fig. 5. Northern corner of extension M2383 (DJ2016a0233B)

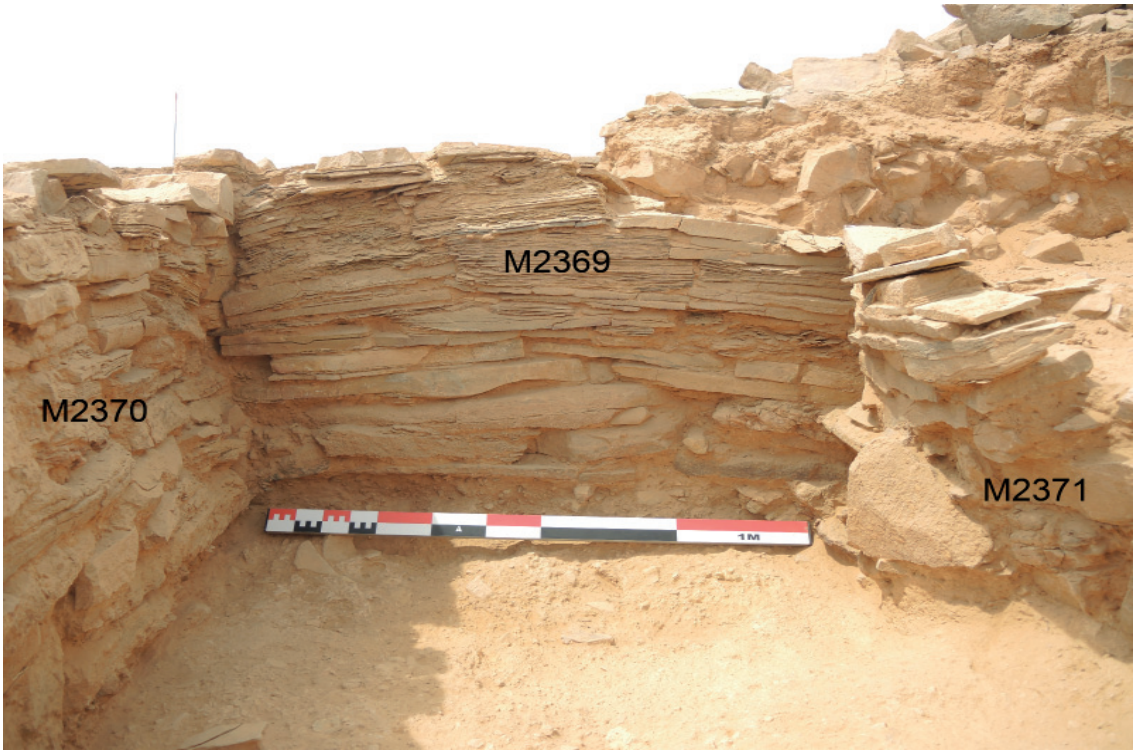


Fig. 6. View of wall M2369

The fill of L2218

The locus L2218 is filled with sandy sediments ranging from yellow to orange and sealed by blocks from a demolition phase (US 2625-2626 and 2627). Unlike the filling of the L2217 locus, we did not observe any carbonaceous or organic levels or faunal remains. Nevertheless, a few flint tools attest to the anthropogenic activity in this space (O.2627-1 and -2).

Phase 3

This feature is a 5.30 m long extension to the west. To the north, the wall M2373 was cleared 20 cm high and consists of two to four courses, which are still in place. A level of white indurated sediment was detected at the foot of this part of the wall (US 2631). M2375 has been demolished (US2632) as it slopes towards the south (alt. 675.30 m). The northern and southern walls (M2373 and M2375) of Phase 3 are strictly aligned with the walls M2376 and M2380 of Phase 2. The western wall M2374, which ends the structure, is parallel to M2379 and measures 3.40 m in length. The blockage of this last phase, brown sediment mixed with heterogeneous rubble (US2633, alt. above 676.01 m), is similar to US2630 and US2618. This extension has the same structural consistency as L2219 and could have been built quickly after L2219. It is also conceivable that M2379 is a relief wall intended to consolidate the building.

Phase 4

The relative chronology confirms the posteriority of the rampart (Unit 7, M2368) in comparison to the platform. This so-called "Hellenistic-Nabataean" monument was constructed of grey to green sandstone blocks, some of which had been carefully squared. The upper courses rest at an altitude of 677.70 m. In sounding 8 (SD8), under the demolition layers of the rampart (US2624), we have found an internal doubling of M2368, labelled as M2382 (**Fig. 7**). The latter rests directly on the north corner of the platform (M2383). This doubling rises to an altitude of 676.54 m. The brickwork of this doubling is similar to that of the M2368 rampart. South of the rampart, under the demolition layer (US2624), we also discovered a buttress (M2381). The latter is linked to the rampart by two cornerstones (**Fig. 8**). The dimensions of the buttress (0.77 m wide and 1 m long) are standard to those observed at the other buttresses of the oasis enclosure. During the excavation, no archaeological material suggesting a date for this enclosure system was found.

Phase 5

This phase corresponds to a later occupation marked by the presence of a fireplace and layer US2628. This stony indurated level of white marl was observed near the M2368 enclosure on the south side. The hearth (US2635) was located against the rampart at an altitude of 676.40 m and recovered. Its dating could provide a terminus ante quem for the use of the platform.

Conclusion

The platform remains at the top of the promontory now constitute a major piece of our knowledge of the prehistoric occupation of the oasis (**Fig. 1**). This evidence is further supplemented by a high density of tombs in the western sector of the oasis.[12] Albeit looted, these funerary structures are similar in shape and topographical location to cairns known throughout the Arabian Peninsula between the 5th-1st millennium B.C. In the Levant, the Negev and the Arabian Peninsula, this association of graves and a rectangular or trapezoidal platform has already been well-recorded, but very often without dating or any deeper excavation. Finally, the recently obtained C14 dates now document the long-term use of the burials in the promontory area, ranging from the Bronze to the Iron Age, which is chronologically consistent with those of the platform and the rest of the peninsula.

12. Chevalier Forthcoming, *Dûma* 5: 74; fig. 4.

Fig. 7. View of the internal doubling of the M2368 rempart, labelled as M2382 (DJ2016a0231B)

Fig. 8. View of buttress M2381 (DJ2016a0185B)

Soundings 24-25, 27-30, 32-33

New geoarchaeological investigations in the Western Sector C

Romain Mensan [1]

Context and goals of the operations

Sector C of the Dumat al-Jandal oasis is a depression bordered to the south by a relief dominating the region (70 m from the bottom of the depression).[2] Its different strata are the remains of the geological history of the area. This landform is called the Jawf Formation:

"Units of purple olive-green and gray graptolitic shale alternate with massive beds of reddish brown to gray in part crossbeded and commonly micaceous sandstone. Varicolored silty shale characterized the shale, and numerous thin beds of limestone and dolomite occur in the 1/3 upper of the deposit. The Jawf formation is capped by a white yellowish limestone deposit finishing the relief ".[3]

To the north, the depression is delimitated by a blue-grey limestone plateau. Here, it is much less elevated than to the south, giving the valley an asymmetrical appearance.

Sector C includes both the remains located on the top of the relief to the south and those located at the bottom of the depression. At this point, a vast enclosure wall has been mentioned by sources for a long time.[4] It was built on a ledge of the limestone plateau, at the foot of the Jawf formation relief to the south and north. The dating and function of this enclosure remain uncertain at this time; the evidence suggests that this monument encloses a space where very few archaeological remains have been detected so far. The main remains identified are structures exposed at the surface: the enclosure and associated facilities, particularly the buildings from sounding 6 [5] and 12.[6]

During the 2015 campaign, we carried out a series of mechanized surveys focused on two objectives: firstly, diagnosing the different parts of the enclosure to understand its mode of

1. TRACES-UMR 5608.
2. Charloux et al., *Dûma 1*: 147, fig. 27.
3. Powers *et al.* 1966: 113.
4. Charloux 2012.
5. Makinson, *Dûma 3*.
6. Cotty 2021.

Fig. 1. View of the 2016 geoarchaeological trenches at the base of the promotory (looking south-east)

construction and its position in the landscape. Secondly, probing the space within the enclosure to assess its sedimentary and, therefore, archaeological potential.

The test excavations inside the enclosure allowed us to excavate mudbrick structures (not dated for the moment) protruding to the surface like the buildings in soundings 6 and 12. However, we could not observe all the sedimentary fills of the area.

The 2016 campaign was therefore devoted to the excavation of ten soundings using a backhoe - preferably at the southern part of the western enclosure (Unit 8). The aim was to search for any archaeological levels in contact with the substrate of the area.

The ongoing operations (Fig. 1)

Sounding 24 (Figs. 2-4)

This is a 30 m long north-south trench. It was opened in 2015 from sounding 21, carried out at Unit 8 of the enclosure. We have reached the substrate throughout the entire area. It is characterized by the variegated green to red marls belonging to the Jawf formation. Thirty metres from the enclosure to the north, we have uncovered a stone structure (M2046). It is an east-west wall, which we were able to follow over the width of 2 m (this was the width of the sounding). In its western part, it is preserved at the height of 2 m. Subsequently, we have found an interruption - possibly a threshold made up of large slabs over a height of 40 cm.

The whole structure lies on brown hardened sand containing anthropogenic materials such as burnt bone and ceramic.

The various stratigraphic sections taken along the sounding reveal a significant filling by aeolian sands alternating with demolition layers from the enclosure. The substrate shows a very strong northern dip, which enabled a strong accumulation of sand, up to 5.50 m at the level of the M2046 structure.

Fig. 2. Sounding 24, looking south (DJ2016a0076B)

Fig. 3. Sounding 24, looking north (DJ2016a0173B)

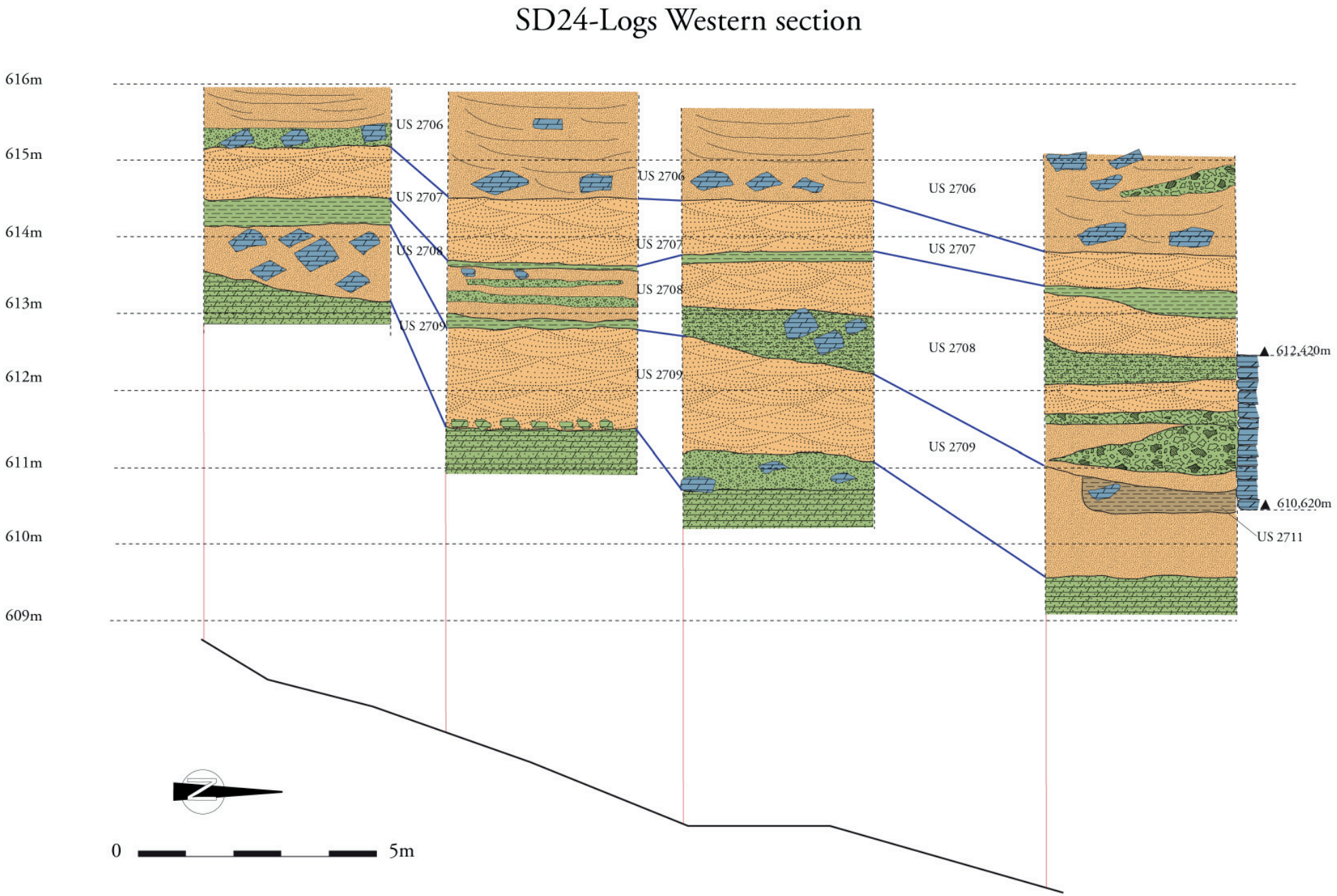


Fig. 4. Sounding 24, West Section (sector C)

Sounding 25 (Figs. 5-6)

This north-south sounding follows the same axis as the previous one, 80 m north of structure M2046. It is 17.50 m long and has a max. depth of 2 m, where we reached the water table at 607.80 m.

At the northern end, a stone structure (wall) preserved over two courses has been raised (M2047). This structure is level with the landscape and quite comparable to the developments already reported in sounding 17 in 2015.

The substrate of the area is made up of variegated marls, which we observed over 0.50 m. It is then covered by a low level of soil characterized by the browning of sandy loam. The water appears just at the level of this paleosol. Above, we observed a medium to a fine sand layer containing a few rolled pebbles without any archaeological material. In turn, this stratum is followed by a layer of coarse sand containing lenses of limestone fragments and remobilized motley marl. Finally, the upper 0.50 m of the stratigraphy are reworked levels.

The coarse and fine sand formations contrast radically with the fillings observed in sounding 24. Indeed, here the sands are sorted, indicating a mode of deposit linked to water. Moreover, the appearance of water in contact with the substrate confirms the alluvial influence on the sedimentation in the area.

On the other hand, the comparison with the observations made in 2015 in sounding 17 seems completely consistent. This sector seems to yield structural remains that hardly retain elevations and whose function could be connected to hydraulic and agicultural structures. This state of evidence would be in agreement with the formations described in depth.

Fig. 5. Sounding 25, looking south (DJ2016a0213B)

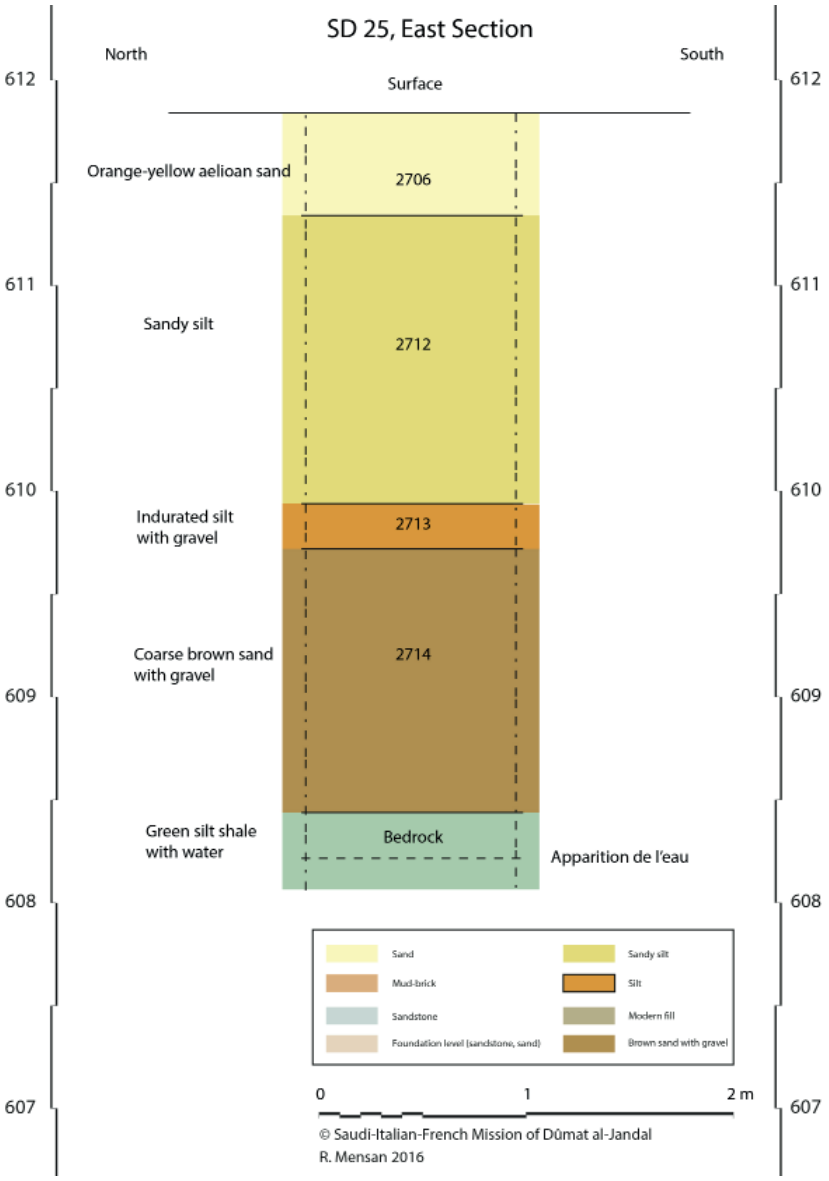


Fig. 6. Sounding 25, East section

Soundings 27, 28 and 29

The objective of these three soundings was to test the hypothesis of intense occupation concentrated in the eastern part of the sector of Unit 8 of the enclosure. Indeed, the main remains of buildings encountered in this sector were in sounding 6 and 12. Unfortunately, we have no connection between these two features due to unsystematic excavation. However, no excavation had previously been carried out west of sounding 6.

The results are final. We did not find any archaeological remains in soundings 27/28, located respectively 40 and 30 m from the western limit of sounding 6 (Fig. 7).

Sounding 29 (dug directly against the sounding 6) also did not deliver any remains of buildings that would indicate human activity

In these soundings, the substrate was systematically reached at a depth oscillating between 2.50 m and 3 m below the surface; it was covered by aeolian sand.

Fig. 8. Sounding 27, looking south (DJ2016a0215B)

Sounding 30

This sounding is located 80 m north of sounding 6. It follows a northeast/southwest orientation over a length of 26 m.

We have cleared an impressive succession of walls (2.45 m high and 20 m long) based on a sand level. As in sounding 25, we reached the water level at an altitude of 607.90 m.

The structure comprises three phases of superimposed developments (from bottom to top): walls M2100, M2049 and M2048 (Figs. 8-9). It seems that the various repairs to this structure are in close association with the addition of backfill. Therefore, no natural formations could be demonstrated, as this sector is of fully anthropogenic origin.

Fig. 8. Sounding 30

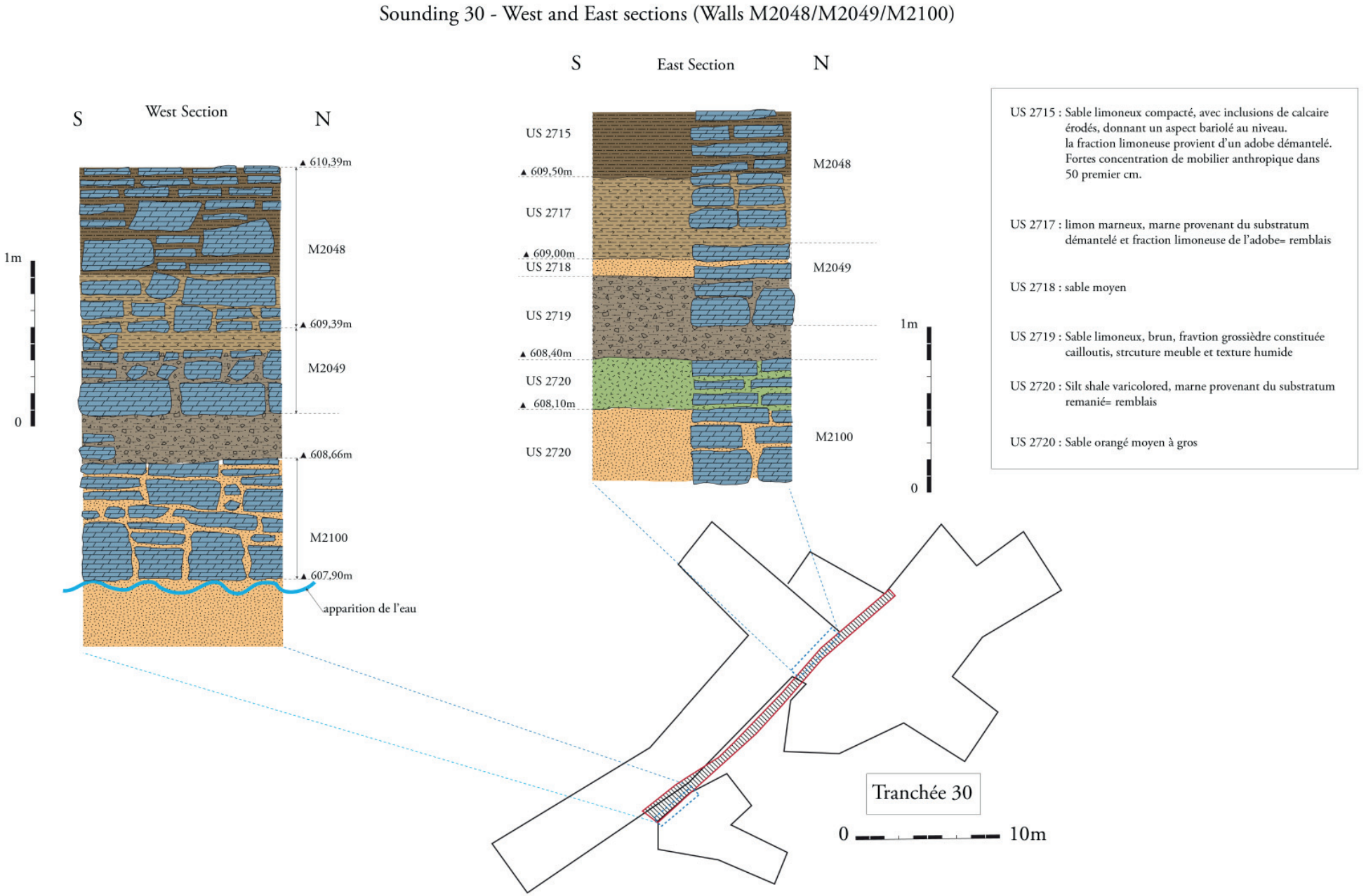


Fig. 9. Sounding 30, East and West Sections (sector C)

Sounding 32 (Figs. 10-11)

This sounding is 20 m long, oriented north-south, and located 180 m east of sounding 24 and 120 m west of sounding 6. To the south, the opening began 15 m from the face of the enclosure wall. Two structures were unearthed 17 m from the enclosure; A stone structure M2101 with an east/west orientation. It was based on the marly substrate reached at an altitude of 613 m. Secondly, we found the structure attached to the first one, built of mudbricks. This second tructure clearly supports the first, which is about to flow down the slope. The M2101 structure is in the same alignment as another M2103 wall located behind the recently built well. The formations that cover the two structures are identical to those observed in sounding 24.

Fig. 10. Sounding 32, looking East (DJ2016a0596B)

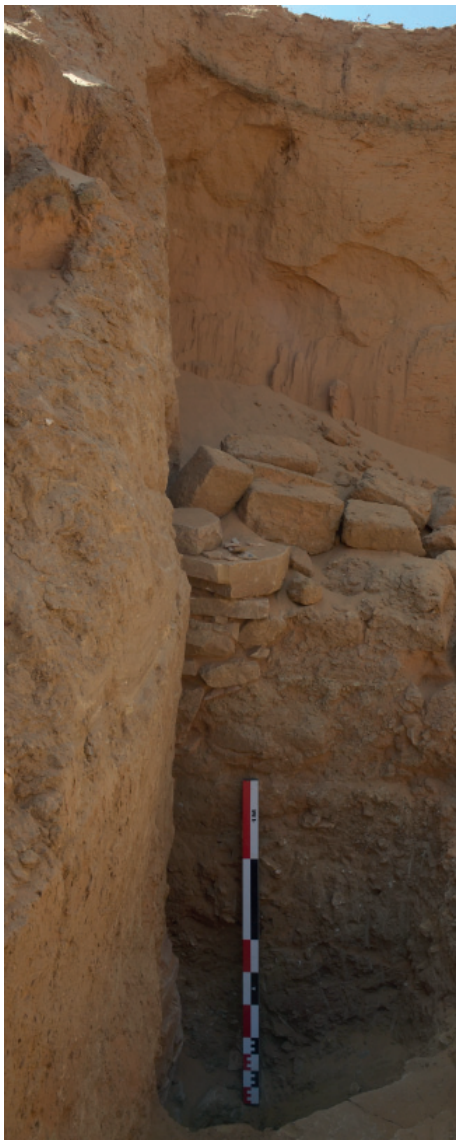


Fig. 11. Sounding 32, looking South (DJ2016a0595B)

Sounding 33 (Fig. 12)

Sounding 33 is 26 m long, oriented north-south, located 40 m west of sounding 32. An east-west facing stone wall (M2105) was excavated about 18 m from the facing of the enclosure wall.

A complex hearth structure (L2184) was excavated against the northern exterior facing of M2105. This is the superposition of four hearths of the so-called "*tannur*" type.

The remarkable conservation of this structure (L2184) provides an ideal dating context. Thus, we can pin down in absolute terms the duration of use of these hearths and, therefore, the duration of human occupation in this locus.

In addition to that, another structure (M2106) was cleared in the sounding. It is a mudbrick wall located 4.20 m from the north-facing of M2105. It is oriented east-west, preserved at the height of 0.45 m and has a width of 1.70 m.

Sounding 34

This sounding is 15 m long, oriented east-west. It is located 22 m west of sounding 33. Two brick structures were recognized:

- M2107: oriented north-south, located on the eastern edge of the sounding.
- M2108: oriented north-south, located on the western edge of the sounding.

These two structures have not been excavated.

Soundings 35 and 36

Sounding 35 is located 25 m west of sounding 34, and no structure has been cleared there. The situation is similar to sounding 36, which is located 20 m from sounding 35.

Fig. 12 Sounding 33 (DJ2016a0720B)

A preliminary synthesis of the operations

The operations carried out in 2016 in the area delimitated by the western enclosure of Dûmat al-Jandal can be divided into two sectors:

- The sector below Unit 8 of the western enclosure, constituting the northern slope bordering the depression where we opened soundings 24, 27, 28, 29, 32, 33, 34, 35 and 36.
- The sector of the depression proper where we opened soundings 25 and 30.

These two sectors have very distinct sedimentary fillings and preserved archaeological remains that are just as different.

The sedimentation of the northern slope of Unit 8 consists exclusively of aeolian sand that in places covers structures over nearly 5.50 m in height (see soundings 24 and 33). More specifically, there are alternating phases of wind-blown sand with the layers from the enclosure demolition of Unit 8. The archaeological remains are difficult to characterize, and not all of them can be dated. However, one can find both areas of occupation very close to the current surface and remains buried under 4 or 5 m of sand.

The first well-preserved and dated context (L2184, sounding 33) indicated a long sequence of pre-Nabataean occupation. At this point, it is absolutely essential to date the various other remains found to compare and model the soil accumulation process of this slope.

In contrast, the sedimentation of the depression is very different: the presence of aeolian sands is not as pronounced or even non-existent. A high proportion of backfill can be identified at the upper parts of the profiles (cf. sounding 30, Sd 17 and sounding 25). Here, with our profile bottoms, we finally reached the groundwater at an altitude of 607.80 m (cf. soundings 30 and 25). Above the water table, alternating sands show rather alluvial profiles or sands linked to the function of this sector.

Moreover, the various archaeological structures observed are very long walls uninterrupted by perpendicular structures. In soundings 25, 30 and 17, these structures are systematically level with the surface. The exact function of these buildings is difficult to define: they are not meant for residence but are most likely linked to the local hydraulic installations.

Sounding 33. Structure L2184

Romain Mensan [1]

During the 2016 campaign, we opened north-south trenches on the southern flank of the depression in Sector C by mechanical means. We aimed to estimate the sedimentary cover of the area as well as the possible archaeological levels preserved. During this task, sounding 33 (**Fig. 1**) revealed the remains of a well-preserved M2105 stone wall in elevation against which the hearth structure L2184 has been uncovered. Structure L2184 is a succession of four superimposed "*tannur*" type hearths. These are very well preserved, and their fill has been dated by radiocarbon. This gives us a good chronological milestone for the occupation and activities in sector C.

Context and filling of the sounding (Fig. 1)

Sounding 33 runs along a north-south axis, is 26 m long and located 40 m east of sounding 14 and approximately 18 m north of Unit 8 of the enclosure wall. Under the imposing infill of the sector, two associated structures were excavated: M2105 and L2184. According to the log east of the trench, the stratigraphic sequence is as follows (from top to bottom, the surface opening lies at 616.25 m):

- US2723 (= 2706): A fill of wind-blown sand, demolition blocks from the southern enclosure Unit 8, punctuated by a slaking crust marking rain levels. This unit has been spotted on the entire southern slope of the sector C depression and constitutes the main unit for recovering archaeological levels. Here, its thickness is 3.20 m. At the height of 615 m, the level of the M2105 wall appears to be largely covered by the wind input.

- US2724: Demolition level from structure M2105, made up of adobe and limestone blocks. The surface of this level is located at 613.40 m.

1. UMR 5608-TRACES.

- US2725: Wind-blown sand level, containing no remains of demolition. The base of this level lies at 613.15 m. This is the line of appearance of the L2184 structure.

- US2726: Ashy level, coming from the operation of the structure US2730.

- US2727: Succession of ashy levels, interstratified with aeolian sand levels. These are remains related to the four usage phases of the fireplaces.

- US2728: Silty sand covering the paving on which the first hearth of structure L2184 is based. This is an occupational level based on the ground level indicated here by the paving.

- US2729: Aeolian sand probably in contact with bedrock that we were unable to reach.

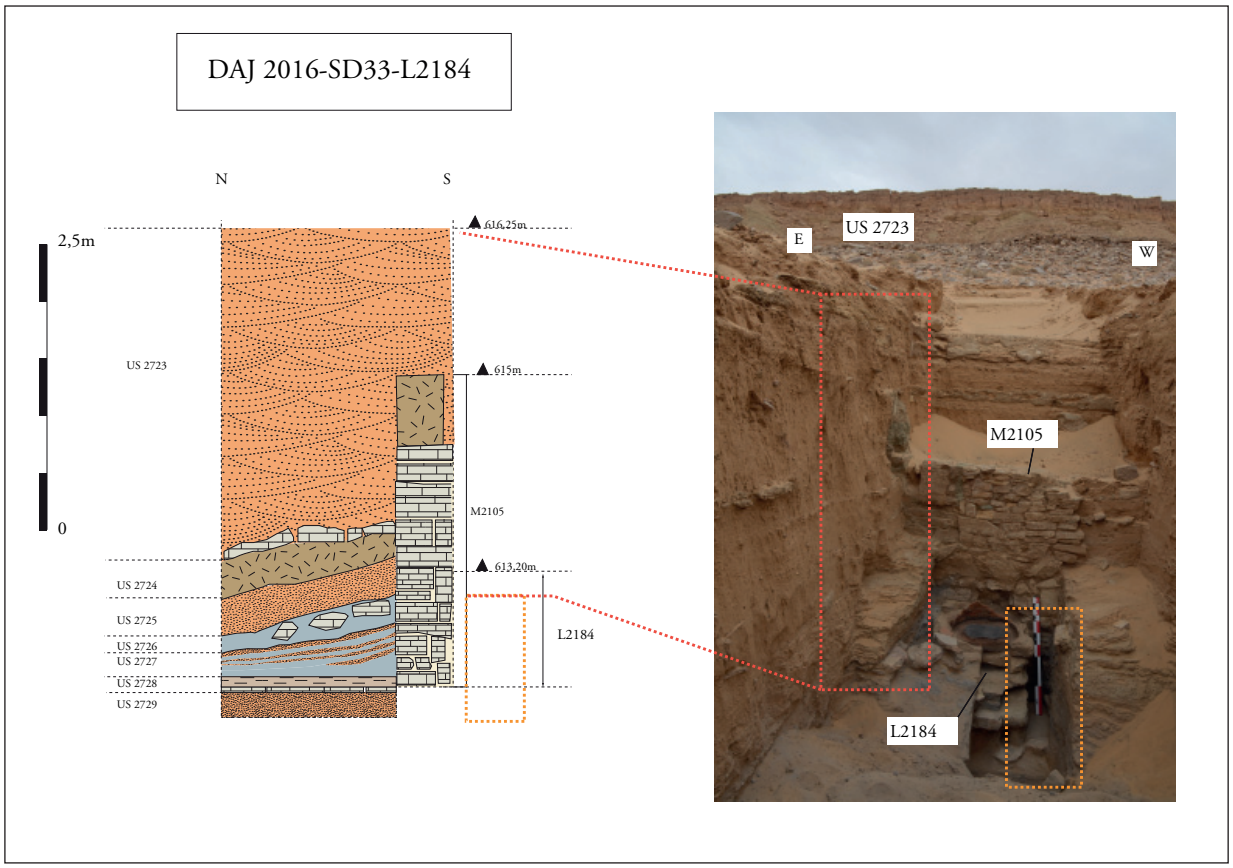


Fig. 1. View in section of souding 33 with the hearth structure L2184

Description of two archaeological features (Fig. 2)

M2105

Structure L2184 was discovered at the north-facing of the stone wall M2105. The latter is preserved to a height of 2.20 m, oriented east-west over a length of 1.50 m and a thickness of 30 cm. It is built mainly in limestone blocks. However, on its upper segment, we have noticed some repairs carried out in mudbrick. In particular, the plugging with a large brick in its eastern part and the addition of one or two adobe layers to its upper part. The western segment of the structure is truncated. However, it seems to continue in the eastern section of the trench. At present, it is impossible to say whether the structure L2184 is located in an interior or exterior space due to scarcity of remains.

L2184 stratigraphic sequence (from top to bottom)

Structure L2184 (1 m high and 80 cm wide) is the superposition of four *"tannur"* fireplaces. We observed the following:

- US2730: This is the first fireplace representing the last phase of the structure's usage. It appears at 613.20 m, 1.10 m below the surface of structure M2105. It is a circular structure built of mudbricks and limestone with a diameter of 80 cm. The varioUSbricks constituting the external structure of the hearth are based on limestone slabs, but also, at least for this structure, on re-used oven walls. The internal structure of the hearth is made up of walls that are burnt red and very fragile when excavated, which could be due to an adobe whitewash against the mud bricks. Inside, the hearth is made of mudbrick (40 cm x 20 cm x 12 cm), the upper part of which is black and very hardened. Note that the reddening appears clearly in section of hearth bottom over a thickness of 5 cm. The structure's base is also made of adobe, but it was difficult to observe whether it was actual bricks or rather a formed adobe structure. The filling consists mainly of grey ash at the base (we removed a piece of charcoal at the E6 excavation, sampling for archaeobotanical analysis). This ash was also found on the wall tops of the broken furnace and the collapsed brick structure. The structure's base is located at 612.83 m, and the entire hearth is preserved for about 40 cm.

- US2731: The second hearth observed during excavation directly under the adobe base of US2730. This is the least well-preserved structure of the context. Its 5 cm thick filling (a charcoal sample was taken during the E5 excavation for archaeobotanical analysis) rests on an adobe structure constituting the base of the hearth. Similar to US2730, it appears to be a cast structure and not bricks attached to each other. The walls of the internal structure were not found. Moreover, the exterior brick walls are also very poorly preserved. The base of the structure lies at the height of 612.67 m, and the entire fireplace is preserved over 16 cm.

- US2732: The third hearth, superimposed directly under the adobe base of the previous structure. This circular structure is bordered to the south by a piece of limestone on which we found part of the displaced filling. Furthermore, we were able to demonstrate that the base of the fireplace consists of two large bricks (and not a formed structure). In the same way as US2730, the internal structure of the hearth consists of reddened walls. The filling of the well-preserved hearth (a charcoal sample was taken during the E3-E4 excavation for archaeobotanical analysis) with a thickness of 5 cm allowed us to observe its micro-stratigraphy: (from top to bottom)
    - ash and black organic matter
    - grey ash
    - burnt red sand from the erosion of the brick structure
    - grey ash
    - The base of the structure is at the height of 612.47 m. The entire fireplace is preserved
    - over 20 cm.

- US2733: Last observed phase of the hearth, constituting the basis of the L2184 structure. Same as the others, it appears directly under the previous structure. It is placed on a limestone paving which seems to continue well beyond the hearth marking the bottom. Mudbricks were placed directly on the paving forming the external structure. Similarly, burnt walls were found directly on this paving. The fill (a charcoal sample was taken during the E1-E2 excavation for archaeobotanical analysis) with a thickness of 17 cm consists of grey ash. No microstratigraphy was observed except for the interstratification of a fine level of aeolian sand, 7 cm above the paving. The upper part of the paving, constituting the base of this last structure, is at the height of 612.29 m. The whole of the fireplace is preserved over 18 cm.

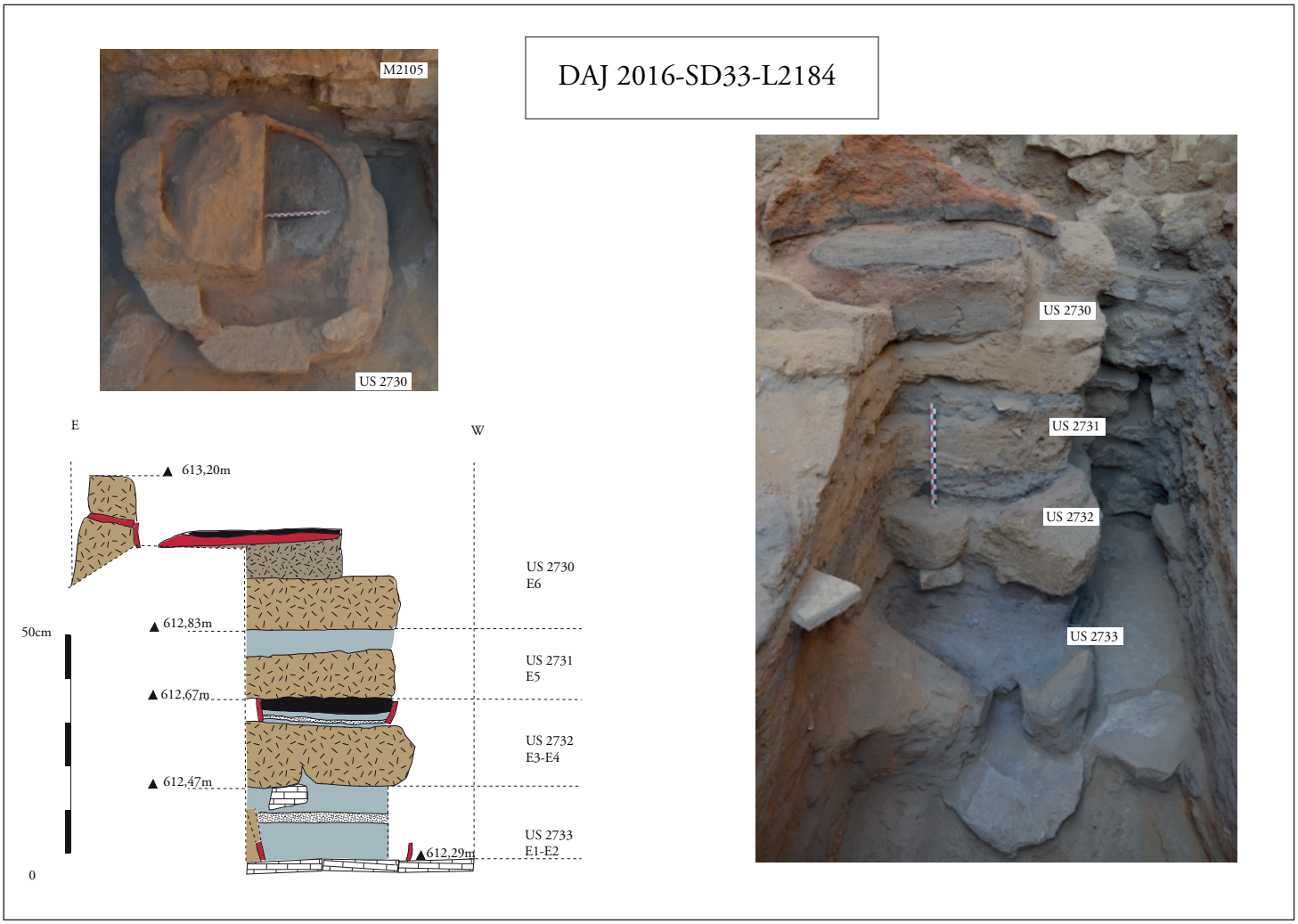


Fig. 2. L2184 stratigraphic sequence

Preliminary synthesis

The first hearth (US2733) is placed directly on a stone paving against M2105; it represents the first phase of occupation at L2184. The paving forms the ground on which the first hearth rests; it is covered by a traffic/passage level (US2728). The assembly of limestone slabs constituting the paving must not be confused with the geological substrate of the depression because, as we have observed on several occasions (particularly in trenches 32, 34 and 35), the substrate is characterized by multicoloured marls (green and red). On the other hand, the horizontal dip of the slabs is in opposition to the strong dip of the southern slope of the depression. Because of the filling sequence described above (US2727/2726/2725), no other soil level was observed above the paving. The sedimentary ensemble that covered L2184 is mainly natural. The contribution of aeolian sand (US2723) is very important as has already been noticed at the southern flank of the depression.

The rest of the fill comes from dismantling anthropogenic structures, mainly made up of adobe and limestone (US2724). In general, these episodes of destruction are often interspersed with an aeolian sand supply (US2725 and 2727).

The L2184 structure comprises four superimposed fireplaces on the identical ground level laid out with limestone slabs. Indeed, the alternation of ashy levels and sands (US2727) in its stratigraphy results from a progressive accumulation of the long usage of the structure. Moreover, the perfect connection of the four superimposed hearths suggests that the builder of each hearth most likely witnessed the existence of the previous one. Another piece of archaeological evidence clearly documents the desire to keep the position of the furnace: the re-use of a fragment of a furnace wall in the modelling of the external part of the structure US2730.

All these arguments indicate this space's functional durability, which goes hand in hand with the long duration of use of the sector. Finally, the fact that the ash discharge area is placed against the structure and the fact that the ash is interspersed with aeolian sand confirms that we are in an outdoor space.

Archaeobotanical results from Locus 2184

Charlène Bouchaud [1]

The archaeobotanical samples discussed in this article come from the four fireplaces 2730, 2731, 2732 and 2733 from structure L2184, which are vertically distributed throughout the stratigraphic sequence. These four sediment samples, 2 litres each, were processed by dry-sieving (using 2 mm and 0.5 mm meshed sieves). All contain carbonised seed and fruit remains, as well as charcoal fragments. Nevertheless, all recovered charcoal fragments were small, making their identification difficult and the number of identified specimens low. The results bring completely new data documenting wild and cultivated flora in north Arabia during the first millennium BCE.

In total, there are 255 whole and fragmented seed and fruit remains (**Table 1**), corresponding to 189 minimum number of items (MNI, **Table 2**) and 17 taxa. Locus 2732 represents the richest sample (130 MNI), and locus 2730 has the smallest yield. Charcoal remains are few and small, and only 102 fragments, representing two taxa, have been identified (**Table 3**).

Clearly cultivated taxa include two kinds of cereal grains – hulled barley (*Hordeum vulgare*) and free-threshing wheat (*Triticum aestivum,* subsp. *Aestivum,* or *T. turgidum,* subsp. *durum*/*polonicum*/*turgidum*) – as well as one undetermined piece of a pulse (a large Fabaceae), and fruit remains, namely date palm (*Phoenix dactylifera*) seeds, petiole and rachis (i.e. the central axis of the leaf, **Fig. 1**), stipe fragments, fig achenes (*Ficus* cf. *carica*) and grape pips (*Vitis vinifera*). The remaining taxa correspond to wild desert plants, including seeds or wood of shrubs (Amaranthaceae, **Fig. 2**, *Atriplex* sp.) and herbaceous plants (*Atriplex* sp., *Boraginaceae*, *Brassicaceae*, small *Fabaceae*, *Helianthemum* sp., *Medicago arabica*/*laciniata*, *Plantago* cf. *ciliata*, *Poaceae*, *Silene sp*.). Some of these plants, especially *Boraginaceae, Fabaceae, Poaceae* family and *Silene sp*., may also refer to synanthropic flora growing on land areas disturbed by humans (roads, fields or field edges, etc.).

The low number of remains makes chronological dynamics difficult to apprehend, and this is also why only qualitative descriptions can be made.

Date palm fruit and stipe or leave remains are present at all periods, documenting the existence of an oasis agrosystem nearby. This has been already demonstrated for the Nabataean period.[2]

1. Researcher CNRS (UMR 7209 – Archéozoologie, archéobotanique. Sociétés, pratiques, environnements, Muséum Nationonal d'Histoire Naturelle).
2. Charloux *et al.* 2016.

The three grape pips found in the oldest layer 2733 may indicate the cultivation of grapevine in the date palm garden. Although we cannot exclude the importation of grapes, this local hypothesis very nicely matches the long grapevine cultivation history in North Arabia, as shown by the presence of grape pollen in the Tayma record as soon as 7000 cal. BP [3] and the well-attested cultivation of grapes during Nabataean times at Dumat.[4] The crop spectra at that time (791-540 cal. BCE) are certainly incomplete because of the limited amount of data. Date palm and grapevine were perhaps complemented by other crops which do not appear during this period but are reflected in the later archaeological record; namely cereals, figs and pulses. Hulled barley and free-threshing wheat are the two commonest kinds of cereal produced and consumed in Arabia from the Bronze Age to Medieval times.[5]

Wild flora is characteristic of the desert environment. As far as we can tell from the data, there is no marked evolution over time, albeit it is not well represented for the earliest period (locus 2733).

Due to their carbonised state and the location in fireplace structures, there can be little doubt that most of these plant remains correspond to fuel residues or discarded products after use. Subsequently, fuel resources are composed of desert shrubby plants (*Amaranthaceae*) and date palm leaves or old trunks, as is often the case in semi-arid and arid regions where the natural wood resources are scarce.[6] Food remains (date stones, cereal grains, fruits) might be the remains of meals thrown into the fire (unless burnt deliberately). Finally, some wild herbaceous plant remains may come from aeolian inputs [7] or pieces of dung used as fuel.[8]

3. Dinies 2019.
4. Charloux *et al.* 2016.
5. Bouchaud *et al.* 2016.
6. Charloux *et al.* 2016.
7. Charloux *et al.* 2016.

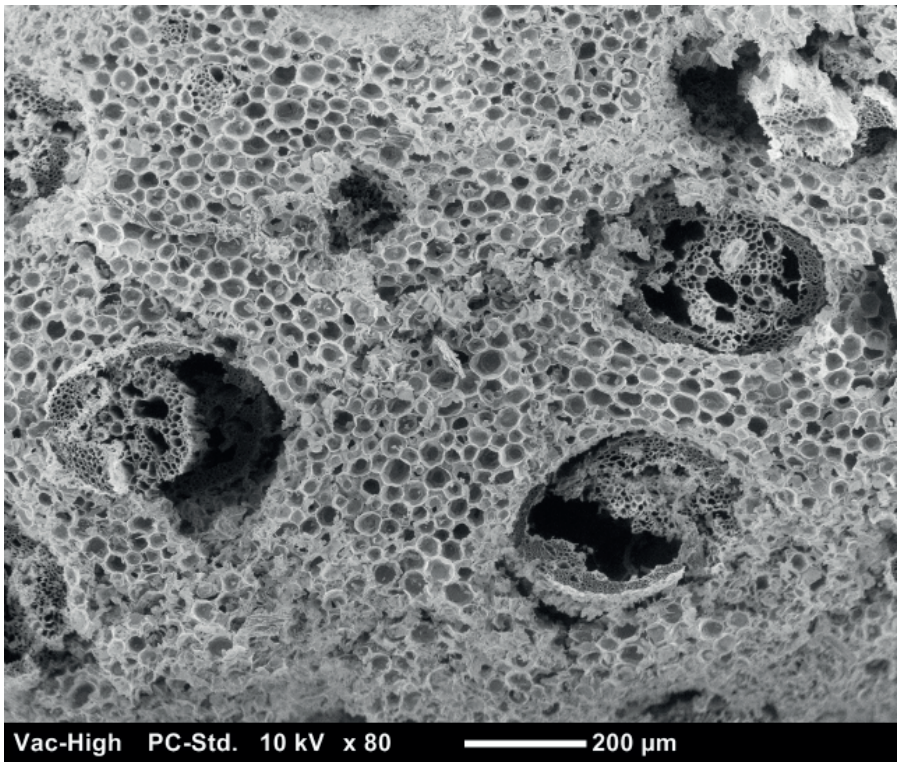


Fig. 1. Date palm petiole, transversal section, DAJ2731, MEB photograph.

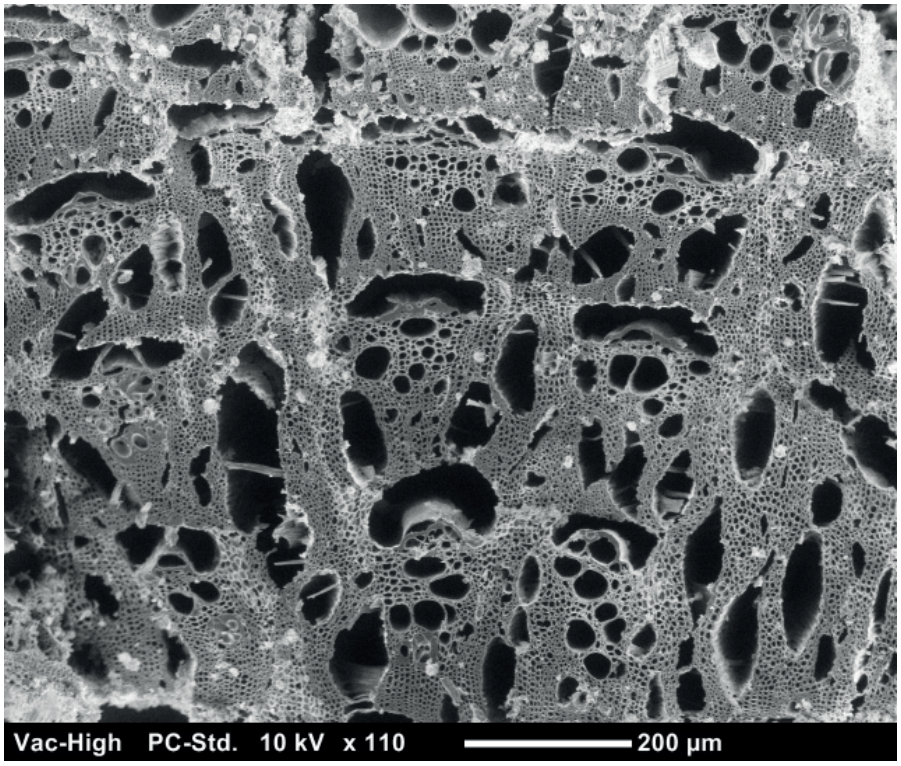


Fig. 2 Amaranthaceae charcoal, transversal section, DAJ2730, MEB photograph.

		2730		2731		2732		2733		
	^{14}C dating (2 sigmas)	from -20 to 131		from -174 to -1		from -393 to -207		from -791 to -540		
Taxa	remains	nr	fgt	nr	fgt	nr	fgt	nr	fgt	Sum
Cereals										
Hordeum vulgare	Caryopsis					3				3
Triticum aestivum/durum	Caryopsis	1				7				8
Cerealia	Caryopsis		2		2		25			29
Pulses										
Fabaceae (large)	Seed		1							1
Fruits										
Ficus cf. carica	Seed					2				2
Phoenix dactylifera	Seed			5			15		36	56
Phoenix dactylifera	Perianth		2	2				8		12
Vitis vinifera	Pip							2	1	3
Wild plants										
Amaranthaceae	Seed	1								1
Atriplex sp.	Bract					2		1		3
Boraginaceae	Nutlet	1		1						2
Brassicaceae	Seed	1		10		87				98
Fabaceae (small)	Seed						1			1
Helianthemum sp.	Seed	1				1		5		7
Medicago arabica/laciniata	Seed	1				8			2	11
Plantago cf. ciliata	Seed	4		3		2				9
Poaceae	Caryopsis		1							1
Silene sp.	Seed	1								1
Unidentified (Flora)	Seed			5		2				7
	Sum	**17**		**28**		**155**		**55**		**255**

Table 1. Seed and fruit remains from structure L.2184, number of remains, whole (nr) and fragmented (fgt).

		2730	2731	2732	2733	
Taxa	remains					Sum
Cereals						
Hordeum vulgare	Caryopsis			3		3
Triticum aestivum/durum	Caryopsis	1		7		8
Cerealia	Caryopsis	1	1	13		15
Pulses						
Fabaceae (large)	Seed	1				1
Fruits						
Ficus cf. carica	Seed			1		1
Phoenix dactylifera	Seed		5	2		7
Phoenix dactylifera	Perianth	2			8	10
Vitis vinifera	Pip				3	3
Wild plants						
Amaranthaceae	Seed	1				1
Atriplex sp.	Bract			2	1	3
Boraginaceae	Nutlet	1	1			2
Brassicaceae	Seed	1	10	87		98
Fabaceae (small)	Seed			1		1
Helianthemum sp.	Seed	1		1	5	7
Medicago arabica/laciniata	Seed	1		8	2	11
Plantago cf. ciliata	Seed	4	3	2		9
Poaceae	Caryopsis	1				1
Silene sp.	Seed	1				1
Unidentified (Flora)	Seed		5	2		7
	Sum	**16**	**25**	**129**	**19**	**189**

Table 2. Seed and fruit remains from structure L.2184, minimal number of items (MNI).

	2730	2731	2732	2733	
Taxa					Sum
Amaranthaceae	13	3	8		**24**
*Phoenix dactylifera*_petiole/midrib	7	15	16	10	**48**
*Phoenix dactylifera*_stipe	3	2	3	20	**28**
*Phoenix dactylifera*_undetermined	2				**2**
Sum	**25**	**20**	**27**	**30**	**102**

Table 3. Charcoal results from structure L.2184.

Sector E.
A water collecting system

Marianne Cotty [1]
Céline Marquaire [2]

Sector E is located in a depression three kilometres west of Sector C, in the oasis of Dûmat al-Jandal.[3] Two semi-buried structures had been spotted there by al- Muaikel (1994) but had not been the subject of a previous excavation campaign. The author's observations only comprised a simple description. The structures have already suffered from disturbance by looters, who had cleared them of sand deposits.

Since then, the area has been completely abandoned. Our aim was to excavate what seemed, at first glance, as a hydraulic structure made up of two rectangular basins (**Fig. 1**) to define its exact nature and assess its dating. Moreover, we wanted to understand its working mechanism better.

Initially, the use of a backhoe[4] made it possible to focus the excavation zone on two central structures: L3006 in the east and L3007 in the west. This was achieved thanks to seven trenches (**Fig. 2**):

- L3008, to the north-west and oriented along a north-west/south-east axis, extends to thesouth-east by trench L3011.
- L3009 has a similar orientation but is located this time to the northeast of the spotted structures.
- L3010 and L3013, both oriented along a south-west/northeast axis, are to the west and
- east of the encircled area.
- L3015 lies south of L3013
- and, finally, L3012 to the south-east of the zone and following a south-west/northeast axis.

With a depth varying from 639.23 m for L3012 to 639.53m for L3009, only the L3008 trench revealed remains of one of the two semi-buried structures in its south-east section.

1. Archaeologist, Louvre Museum, AO.
2. PhD student at Université Paris I – Panthéon-Sorbonne.
3. Note of the editors: this report, with few complements made in 2017, was published in a synthesis article : Marquaire *et al*. 2018: 251-268.
4. Under the supervision of G. Charloux and R. Mensan.

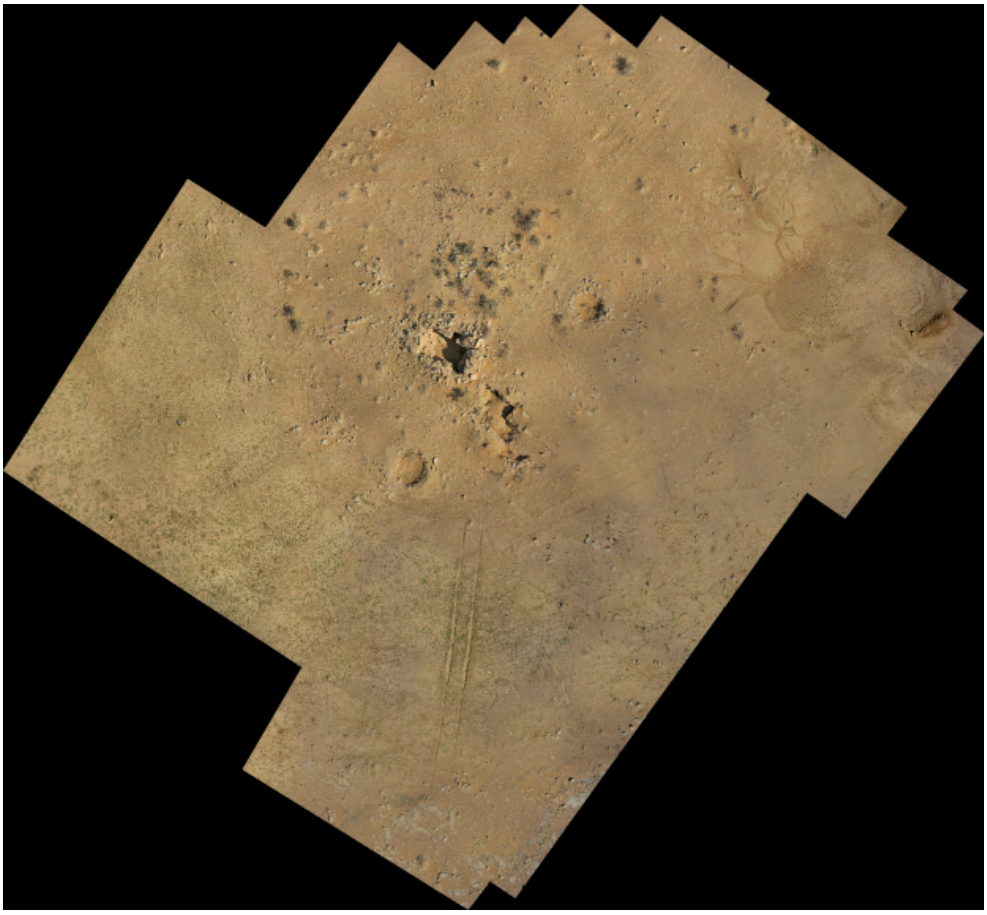


Fig. 1. Orthophotograph of sector E before the excavation (DJ2016a0412b).

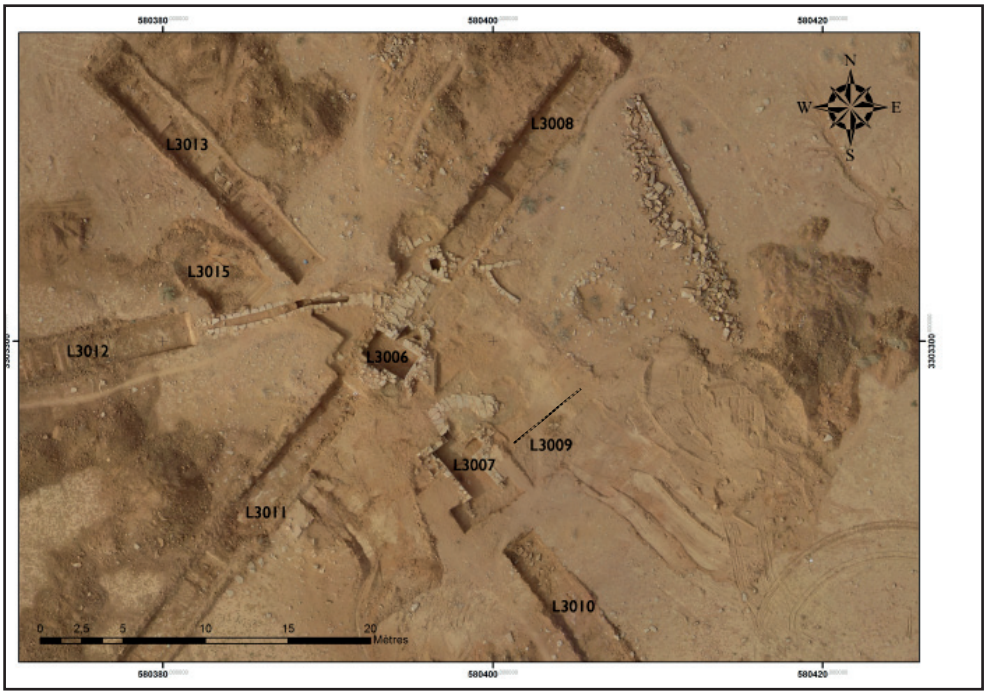


Fig. 2. Orthophotograph of sector E after the excavation

Fig. 3. M3001 after looting. View to the south (DJ2016a0413b)

Once this perimeter of the excavation was established, the excavations within Trench 1 of sector E took place from March 16 to 29, 2016, with a team of around ten workers. Unfortunately, we experienced looting on two successive nights during this period, on 18/19 and 19/20 March. The looters partially damaged the walls of L3006 and L3007 (the masonry of the walls M3001 and M3009 has also been defaced (**Fig. 3**) and the junction of walls M3003 and M3004). They have also dug looting holes in these structures and south of trench L3008.

Structure L3006

Phase 1

We excavated a large rectangular basin oriented north-west/south-east (**Figs. 4 and 5**) connected to several channels. The bottom, lying at an altitude of 639.29 m, is composed of large horizontal bedrock slabs, while the walls, all built of blocks from a compact and very fine grey limestone, are characterized by dry stone masonry.

The wall M3006, oriented south-west/north-east, is preserved on 16 courses, i.e. a height of 1.15 m (upper altitude: 640.52 m; lower altitude: 339.30 m), while its thickness is 0.70 m. The M3007 wall, also oriented south-west/north-east, is preserved on 15 courses and standing 1.25 m high (upper altitude: 640.53 m and lower alt.: 639.59 m).

M3005 is the wall of the eastern face, oriented south-east/north-west (**Fig. 6**). It is preserved over 24 courses, i.e. at the height of 1.20 m (upper altitude 640.52 m; lower altitude 639.28 m).

M3008 represents the western counterpart of M3005: parallel to the latter; it is preserved on 12 courses and 0.6 m in height.

Finally, M3009 is the south wall of the L3006 basin. It follows a south-west/north-east axis over 4 m long. It is preserved on 15 courses at 1.25 m in height, and its thickness is 0.40 m.

At the corner of walls M3005 and M3009, an opening (L3028) has been identified at an altitude of 639.55 m. It could correspond to the start of a pipeline; unfortunately, some remains concerning this potential structure are lost due to older looting (no cover slabs have been found). Therefore, we do not know if L3028 is linked to the other structure, L3007. Nevertheless, we have observed that at this spot, the southern part of the M3005 wall bends towards the east and that the beginning of a pipeline was laid out in the US3014, a very compact sandy sediment. This is a sign that some development was taking place in the south-east, well beyond L3006.

The M3007 wall has an opening (0.40 m wide) corresponding to the L3023 pipe, covered with long slabs (80 cm long and 10 cm high). The slabs rest on walls M3019 and M3008, which have not been cleared along their entire length to the north. Unfortunately, the fill of this L3023 pipe was largely excavated by the looters (**Fig. 7**). L3023 is 4.20 m long and oriented along a south-east/north-west axis; it connects the L3006 basin to a well in the north: L3024 (**Fig. 8**).

The preserved height of L3024 remains unknown, as the structure could not have been fully excavated. The well was covered with slabs, similar to those covering the L3023 pipeline. Its upper altitude is 640.35 m. It lies under a layer of sand mixed with green crumbling limestone, US3016, visible in the eastern section of trench L3008. On the surface, the well's rim is marked by a stone foundation arranged around the opening. Its corbelled masonry was cleared over 1.5 m in height. The diameter of the well was 1.70 m (observed at 638.90 m a. s. l.). A question remains regarding the connection between L3023 and L3024, as no drilling was observed in the masonry of the well.

Near L3024, a piece of masonry has been partially cleared to the north: M3020 (about 1 m long, upper altitude at 640.01 m). We were unable to determine its function during the excavation (**Fig. 9**).

Another development of phase 1 is located between M3006 and M3007. An alcove, named L3004, was fitted against M3019 (**Fig. 10**). The low wall M3023 (oriented east/west), which adjoins M3019, is 0.6 m long and has an opening linked to the rectangular basin L3026 (**Fig. 11**), of which only a few stones remain. The eastern face of the L3026 basin is a wall linked to M3023, which bends to the north for 1.6 m: M3024. The eastern face of the L3004 alcove is formed by a concave wall, M3006, while to the northeast, the layout is closed by the L3020 staircase. The wall M3010 surmounts the staircase and closes the access.

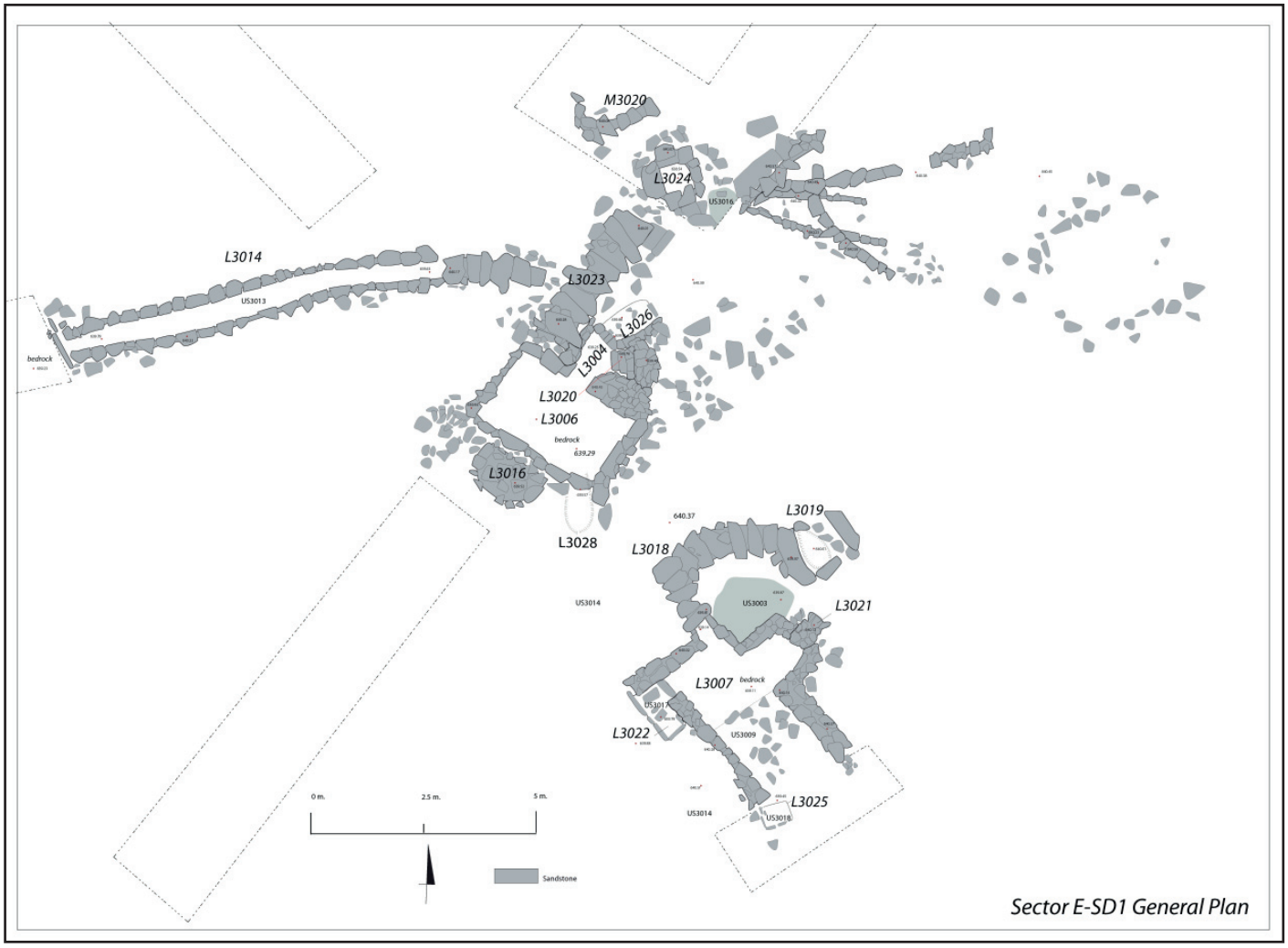


Fig. 4. General plan of SD1.

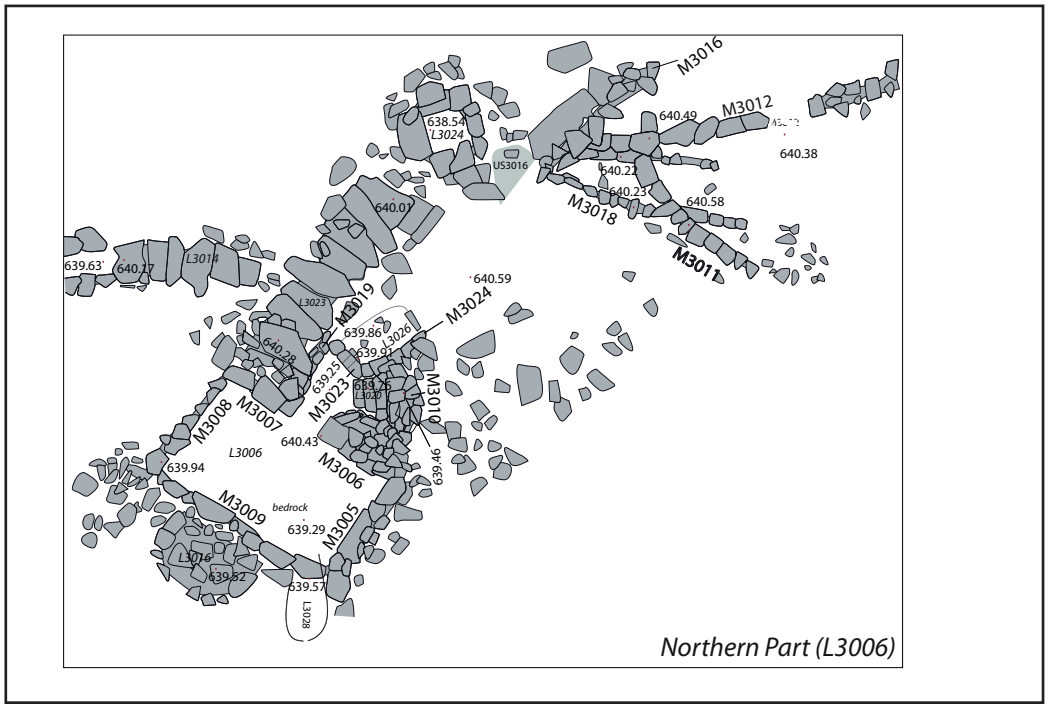


Fig. 5. Plan of structure L3006.

Fig. 6. Wall M3005. View to the east (DJ2016a0915b).

Fig. 7. Opening of pipe L 3023 in M3007. View to the northeast DJ2016a0915b).

Fig. 8. Well L3024. View to the east (DJ2016a0915b).

Fig. 9. View of the survey to the south-east (DJ2016a0894B).

Fig. 10. The alcove L3004 with the stairs L3020 and L3026 (DJ2016a0918b).

Fig. 11. View from L3026. View to the west (DJ2016a0918b).

Phase 2

Subsequently, a second construction phase has been identified: masonry in the form of a half-apse, L3016, reinforces the wall M3009 (**Fig. 5**). Placed against the wall outside the basin, this arrangement is not linked to wall M3009 and is only preserved on two layers of stones, 0.85 m thick. It is platform-like and 1.35 m wide at its strongest point. The apse L3016 lies at an upper altitude of 640.56 m and was founded at 640.35 m (lower alt.).

Here again, it is a dry limestone masonry. Moreover, we would like to note the use of a particular construction mode, although irregular. This is substantially similar to that of phase 1, varying from 25 cm in length by 6 cm in height to 54 cm in length by 7 cm in height. This small variation in the height of the blocks explains why the ratio between the preserved height and the number of observed layers is constant. The average thickness of these blocks is 24 cm.

Another pipeline, L3014, joins L3023 north of L3006. This pipeline could be traced for its entire length, 14 m, and follows a south-west/north-east route. Its northern half is still covered with slabs over 3 m long, and its walls are preserved for up to four courses. It seems that the channel L3014 was built in a second phase because on the surface, the junction between this one and L3023 is executed with a much smaller module and arranged in a chaotic manner (**Fig. 12**). Thus, this breaks with the regularity of the large blocks, similar to the cover of L3023, and observed in the cover of L3014 further south.

Its southern end is marked by a large stone laid on edge and pierced with at least five small regular square openings, and a sixth one is central and wider than the others (**Fig. 13**). This was probably done to allow regular water circulation. Other stones obstructed it from the pipe, which had collapsed after the abandonment of the complex. The pipeline extension is quite low since, out of the 11 m excavated, its bottom was reached 639.79 m altitude in the west and 639.63 m in the east, with a slope of 1.45 %. It is surprising to see that the slope, although weak, falls from east to west.

At the bottom of L3014, we found shards of coarse ceramic in the very hard sandy sediment that filled the pipe (**Fig. 14**). These are fragments of a Late Roman or even Byzantine vessel.

Fig. 12. Channel L3014 at its junction with L3023. View to the north-west. (DJ2016a0902B)

Fig. 13. Channel L3014. View to the south-east (DJ2016a0902B).

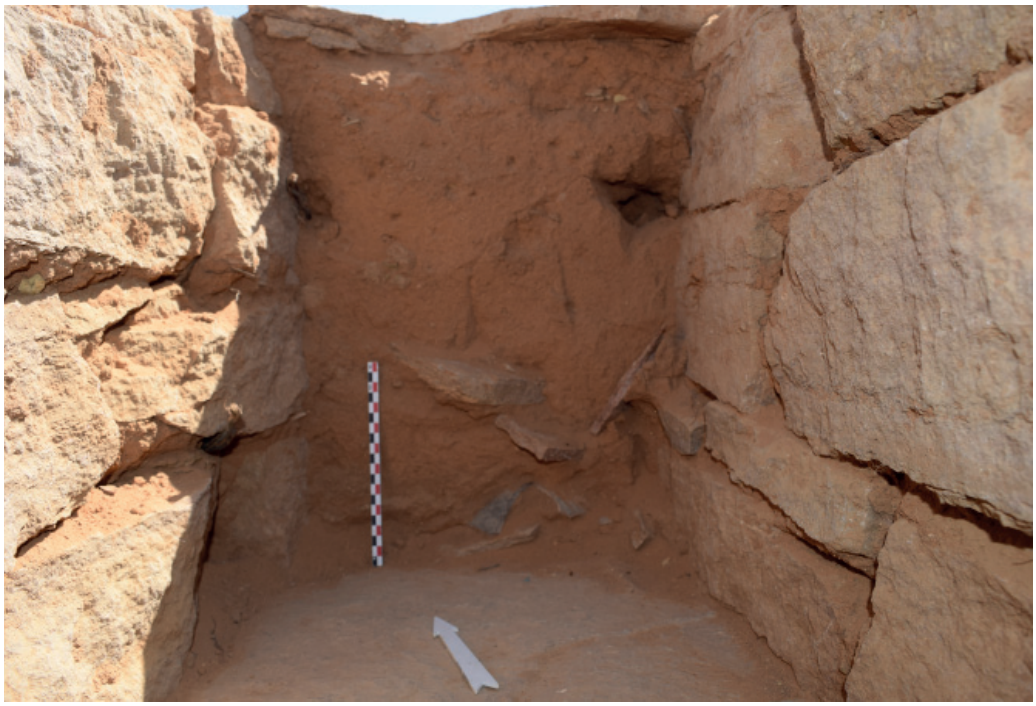


Fig. 14. The eastern section of the channel L3014 (DJ2016a0680).

Structure L3007

Phase 1

The structure is oriented north-west south-east and is open to the south-east. The western corner of the basin is linked to pipe L3018, which leads to well L3019 (**Fig. 15**). The walls are semi-buried and are characterized by a limestone device in dry stones. We distinguish the use of a more impressive construction mode for the foundation courses (**Fig. 16**), while the approach used in the elevations is the same as that observed for the construction of L3006.

To the north, M3004 is 3 m long and preserved over nine courses and 1 meter high (upper altitude of 640 m, lower alt. 639.13 m). M3013 lies on the same axis (upper altitude: 639.49 m) and is attached to US3003 (a mixture of green marl and coarse sand). A recess is between these two walls made up of the following walls: M3015/M3014/M3003. Only a few foundations of M3013 and M3014 are preserved. In fact, some destruction debris of these walls has been cleared. These walls also rest against the US3003. The development is linked to M3013 and M3004. In M3003, at an altitude of 640.16 m, a channel has been cleared: L3021. It is made up of small blocks oriented north-east/south-west. No other external hydraulic arrangement associated with L3021 has been found.

To the west, M3002 is oriented south-west/northeast and 2.10 m long (over nine courses). It is preserved 1.15 m high (altitude higher than 640.21 m and lower than 639.12 m) and its thickness reaches 0.42 m. At the north end of M3002, a more massive block forms an angle with M3022 (**Fig. 16**).

M3013 and M3022 form the two walls of the covered pipe L3018. The width at the entrance to the pipeline is approx. 0.22 m, for a height of approx. 0.60 m. The roofing consists of large slabs with a gauge of approximately 1 to 1.20 m. The pipeline runs west for 1.75m, then bends 3.25 m towards the L3019 shaft. The cover slabs of the well were cleared, revealing four walls (**Fig. 17**). The masonry's depth and nature in this well are unknown, as it has not been fully excavated, but its masonry appears to be similar to that observed in L3024.

At the eastern end of M3004, we observed an element of masonry suggesting perhaps a closure system, which has now disappeared. Indeed, M3004 and M3001 stop here, and no wall closes the structure L3007.

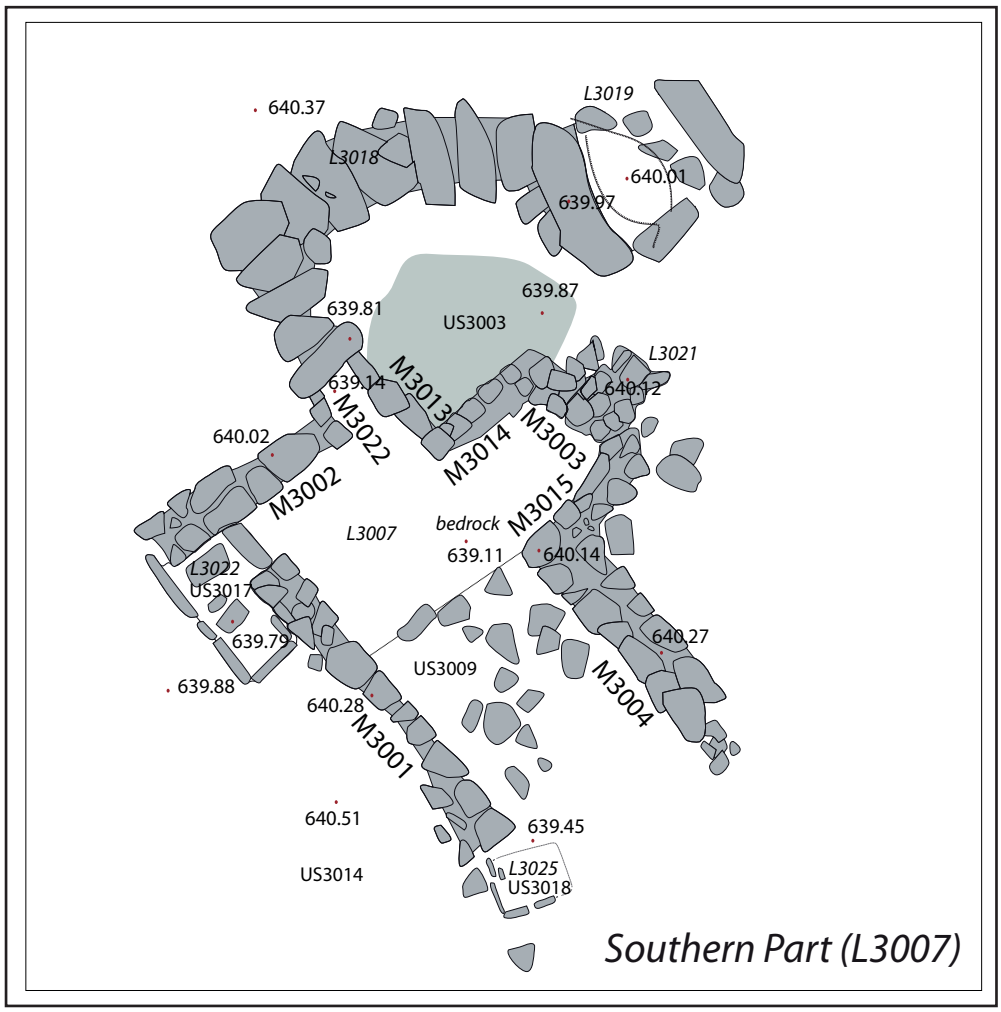


Fig. 15. Plan of the structure L3007.

Fig. 16. Opening of pipe L3018, left: M3002 (DJ2016a0924b).

Fig. 17. The L3019 well and L3018 pipe (DJ2016a0922B).

Phase 2

The walls and fittings on the south side were probably built at a later stage than Phase 1. In fact, M3001 is not linked with M3002 and leans against it (**Fig. 18**). M3001 (0.42 m thick) is preserved over ten courses and 1.15 m high (upper altitude: 640.28 m). It rests on the bedrock at an altitude of 639.09 m. West of the wall M3001, a 30 cm long opening was made, which was blocked by horizontal slabs. This blockage is linked to a rectangular arrangement attached to M3001. L3022, arranged in US3014, comprises raised slabs, 0.60 m wide and 1.40 m long. The very compact sandy sediment inside L3022 (US3017) seems to indicate past water stagnation. At the eastern end of M3001, a similar masonry unit named L3025 has been excavated. This assemblage, although destroyed, evokes the same type of structure as L3022. Indeed, we have found the same standing stones and a very compact sandy sediment (US3018).

Many ceramic shards were found in the main basins L3006 and L3007. Unfortunately, they do not have a solid archaeological context due to the repeated looting of these features. On the other hand, several shards were found outside. One, in particular, comes from hard sediment north of L3006: C.30151-2-3 (**Fig. 19**). Once again, this artefact suggests a dating to the Late Roman or even Byzantine period.

Fig. 18. The wall M 3001 (DJ2016a0923B).

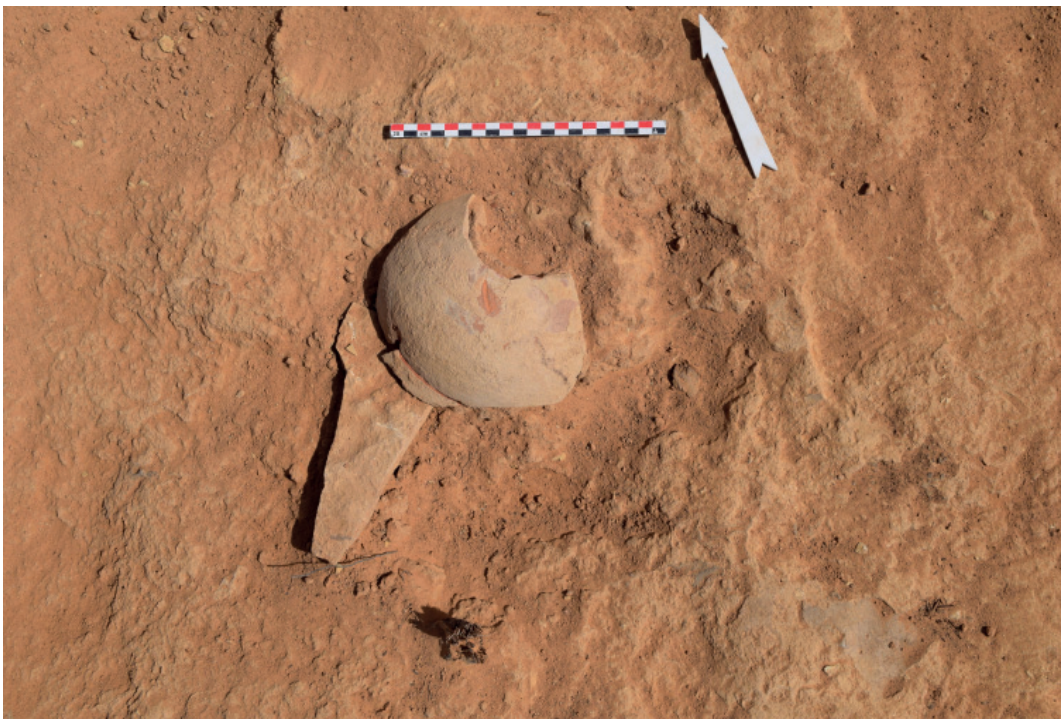


Fig. 19. Ceramics C.30151-2-3 (DJ2016a0734B).

The Assemblage M3011/3012/3016/3017/3018

East of L3024 lies a concentration of walls, which shall be described here:

M3016 is located along the northern Trench, L3008. This 2.7 m long wall, whose upper altitude lies at 640.57 m, is destroyed in places, and only one or two courses can be distinguished (**Figs. 20 and 9**).

M3012, which has the same orientation as the pipe L3014, is only kept on a foundation level. It was tracked over 6.25 m in length, while its upper elevation reached 640.49 m.

M3011, which has an upper elevation of 640.57 m, is a 3 m long, slightly curvilinear segment. It forms a 60-degree angle with M3012. M3012 and M3011 are based on two low walls: M3017 and M3018.

M3018 is 3.6m long, and its upper elevation is 640.23m.

M3017 is 2.30 m long, and its upper altitude is 640.22 m. (**Fig. 21**). The relative chronology allows us to confirm the later date of these low walls compared to the buried structures, canals and wells described above.

Fig. 20. East section of trench L3008 (DJ2016a0892b).

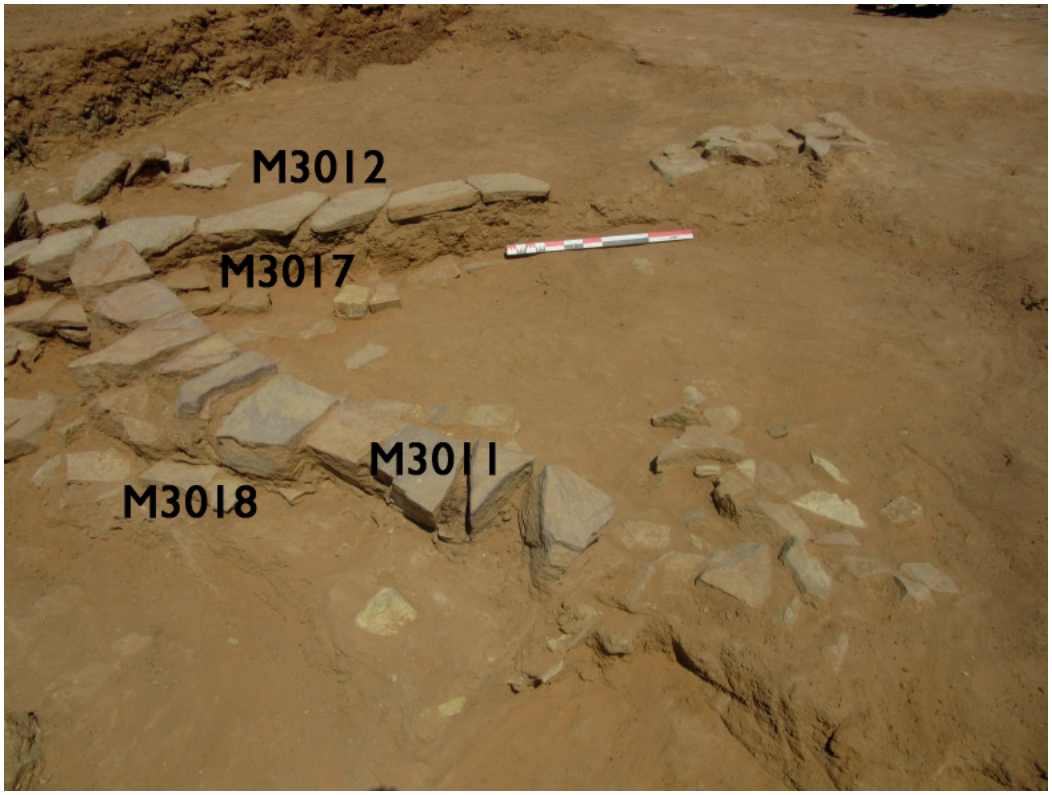


Fig. 21. The walls M3011, 3012, 3016, 3017 and 3018 (DJ2016 a885b).

Conclusion

The two structures described above (L3006 and L3007) are 4.5 m apart and substantially similar, suggesting they were designed and built together. These are two semi-underground, sub-rectangular buildings with an alcove on their northeastern face in which a channel is made.

Both have a covered pipeline between the main basin and a well. In L3006, the mouth of the canal has a lintel and is noticeably larger than that of the L3007, probably allowing easier cleaning. Although the function of the small rectangular installations L3025, L3022 and L3026 remains to be determined, it can be assumed that they were intended to collect excess water. Although partially destroyed, we notice that their widths are practically identical. Therefore, the hydraulic function of this archaeological sector seems certain, as it is associated with basins, 'wells', canals, and partition walls. Adding to this evidence is a stone showing traces of rope, which was found in the immediate vicinity of L3006; similar to the traces left by ropes when water is drawn, it is possible that this stone was originally part of the coping of a well (**Fig. 22**).

However, the exact use and functionality of these structures s is still unknown. One can imagine that the L3006 basin, equipped with a staircase and apses, could also serve as a reservoir/drinking trough. Located on the edge of the oasis, it is likely that this location was, from antiquity, a stopover for shepherds leading their flocks to graze - as is still the case today - or a stopover for caravans.

Agricultural use is also very plausible. It can be assumed that the wells were intended to provide access to the groundwater. The water flowed through the covered pipes and was then collected in the semi-buried basins. Subsequently, the harvested water was redistributed to small rectangular facilities outside or agricultural plots through pipelines such as L3014 or L3028.

However, what still holds is that the declining slope of the pipeline L3014 from east to west suggests that the water was flowing towards the pipe L3023 and not towards any potential agricultural plots. In addition to that, we did not note any opening in the internal facing of L3024, although the level reached in well L3024 was lower than that of the bottom of basin L3006. One can, therefore, wonder about the path taken by the water between the well and the pipe L3023. This opening may have been closed once the well was out of use.

As already said, the exact function and chronology of these structures have yet to be determined. Were these facilities intended to irrigate the surrounding crops or drinking water reservoirs for livestock and people? Or perhaps both? We hope that future excavations will determine the use and relationships between these facilities and initiate hydrogeological research in this area.

Fig. 22. The stone is probably part of a well coping found near L3006 (DJ2016a0303B).

Abbreviations

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