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The Archaeological Project in Al-Bad‘ (Tabuk Province) - 2017 Season

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With the participation of Saud Mohammed Almadhi,⁴ Abdul Elaqh Kalaf Al Timani,⁴ Abdul Aziz Al Nawfal,³ Mohammed Ali Al Qahtani,³ Kevin Guadagnini⁵ and François Larché¹

Through the abundance and majesty of the archaeological remains, the beauty of its landscapes and its proximity to the sea, the site of al-Bad‘ in the province of Tabuk (28°29’34 N; 35°00’26 E) has all the assets necessary to attract many Saudi and foreign visitors (Plate 3.1). Over the next decade, the stated objective of our joint Saudi-French project, co-directed by G. Charloux (CNRS, UMR8167), S. Sahlah (KSU) assisted by W. Badaiwi (responsible of the SCTH team), will be to highlight the timeless quality of the heritage of the oasis, while participating in its safeguarding and preservation. The first phase of the study program aims to reveal the little-known archaeological potential of this oasis through a wide range of advanced techniques, field surveys and test trenches. Although part of our activities will concentrate in the future on the extensive clearing of the main central sector of al-Malha, our 2017 season aimed at surveying the whole oasis - no aspect of which can be excluded; indeed, the study of

its diachronic evolution necessarily involves taking into full account its environment and all stages of occupation, from its formation to its recent urban development.⁶

Overview

Although little known by the general public and the international scientific community, the oasis of al-Bad‘ constitutes, without doubt, one of the largest and wealthiest oases in north-western Arabia in terms of history

6 The first season took place in November 2017. Funds, technical and scientific support is provided by:

- French institutions (the French National Centre for Scientific Research (CNRS); the French Ministry of Foreign Affairs (MAE); the French Embassy, Service de coopération et d’action culturelle (SCAC), Riyadh; the laboratory UMR 8167, Orient & Méditerranée, “Composante Mondes sémitiques”, Paris; the laboratory UMR 5608, TRACES, Toulouse; the laboratory UMR 5133, Archéorient, Lyon; the Muséum National d’Histoire Naturelle (MNHN), UMR 7209, Paris; the Labex Resmed, University Paris IV, Religions et Sociétés dans le Monde Méditerranéen, Paris; the Centre Français d’Archéologie et de Sciences Sociales (CEFAS), Kuwait City; the Centre franco-égyptien d’études des temples de Karnak (CFEETK), USR3172, Luxor; the université Paris 1 Panthéon-Sorbonne; the Université de Strasbourg, École et Observatoire des Sciences de la Terre (EOST), Strasbourg.
- and Saudi institutions (the Saudi Commission for Tourism and National Heritage (nowadays Ministry of Culture), Riyadh; the King Saud University, College of Science, Department of Geology and Geophysics, Riyadh; the Department of Antiquities for the province of Tabuk, Tabuk).

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and heritage. Located in the province of Tabuk, it controlled the only access via the wadi ‘Afâl to Aqaba and Jordan-Palestine from the major harbours of the eastern Red Sea coast, in particular ‘Aynuna (Leuke Komê?) and Sharma (Ghabban 1993).

The oasis is about 7 km long with a variable width estimated between 500 m and 2 km maximum from north to south, which is explained by its specific location on the banks of the wadi ‘Afal at the apex of the isosceles triangle formed by the Lisân basin (Clark 1987). Ancient settlements – nowadays all protected by modern metal fences – stand on both sides of the central alluvial corridor of the wadi (Plate 3.2). They are hemmed into the east by the Jabal al-Safra, which is made up of conglomerates, marl, and gypsum and coral limestone (Bad‘ formation). The base along the whole western side of the Jabal was intensively inhabited in the past (from north to south: al-Qala, Rudaydah (also called Shayb Darak), al-Burj, al-Malqata and al-Adafa). To the west, ancient archaeological areas are delimited by the Jabal Musalla, made up of a poor quality sandstone and marl (Nutaysh formation), into which the Nabataean tombs of Mughayr Shu‘ayb were dug. The ancient city (al-Malha) and the area of al-Asifir to the south seem to stand partly on top of this formation, which is flatter to the east, and on a thick, elongated terrace of conglomerate, which has helped to protect them from the wadi. Only the Islamic site of al-Malqata and the ancient agricultural area of al-Adafa are located in the middle of alluvial terraces. The

modern city is situated to the north of the historic oasis and also south-west of the Jabal Safra, therefore outside of the main wadi bed. However, recent cement walls have been built to protect palm groves and houses.

The oasis was visited several times in the past, both by Arab historians and geographers and by Western travellers (for a non-exhaustive list, we refer to Ansary (al-) et al., 2002: 17-24). However, their descriptions of the archaeological remains were brief, sometimes confusing the toponymy of the locations mentioned. Advanced scientific studies have recently been conducted on the ancient necropolis (Badaiwi 2011, Nehmé et al., 2015), on the al-Burj fort (Badaiwi, 2014) and the Islamic-period remains (Ghabbân, 2011); on that occasion, the first archaeological investigations in the sector of al-Malqata were carried out.

Most scholars agree to the association of this ancient oasis with ancient Midian/Madian, mentioned many times in the Bible, the Koran and by classical authors (Flavius Josephus [Midiana], Ptolemy [Madiama or Modiana] (see Musil, 1978, Parr et al., 1972, Robin & Ghabban 2018, Tebes 2020).

Preliminary scientific issues of our project

The scientific issues related to the ancient and medieval installations of al-Bad‘ have been but poorly addressed until now, in contrast to other main north-western oases.

Environment and settlement of the oasis

A Prehistoric installation?

Surprisingly, archaeological surveys by the Saudi Comprehensive Survey Program carried out in the closed vicinity (10 km) of al-Bad' revealed little prehistoric occupation from the Palaeolithic, the Neolithic, Chalcolithic or Bronze Age periods (Ingraham et al., 1981). Knowing the attraction of people to such green havens abundantly supplied with water, and the early development of oases in Arabia, it would be surprising if there were no occupation in the area predating the Iron Age. Unless the environment was not conducive to a human settlement before the Holocene, which is doubtful.

The study of regional settlements in arid environments covers many aspects of environmental and archaeological research and leads to multiple questions: What was the oasis like during wetter phases? How has it evolved over time? How did populations settle and how did settlement at the regional level develop in parallel? What was the rate of occupation of the oasis? Are we likely to discover traces older than the Iron Age, for example from the Bronze Age, which are known from the Sinai desert, the Aravah valley, southern Jordan and Arabia?

Evolution of human settlements and landscape transformation

Environmental studies help us understand the stages of human settlement. How has the landscape changed, been transformed and developed over the long term? When was the oasis cultivated for the first time? How did the diet of the indigenous populations evolve? It is also necessary to define natural constraints in order to delineate the functionality of oasis spaces. Evidence suggests, for example, that the course of the wadi 'Afal has 'always' constituted a wide corridor running through the centre of the oasis; it is both dangerous and difficult to control, as proved by the spectacular destruction of the north-western part of the archaeological area of al-Malqata. This observation indicates that the course of the wadi has fluctuated over time, either due to natural (well-known in fluvial contexts) or artificial (construction of structures designed to contain ephemeral torrents) reasons. What are these installations? When were they built? And what human and other resources were allocated to these large-scale enterprises?

The Late Bronze Age-Iron Age "Midianite" occupation

Although the Late Bronze Age/Iron Age "Midianite" occupation of the site appears almost incidental for the moment, it will be essential to characterize the nature and the extent of its presence during this period. Are the traces already discovered those of a more permanent or only of a temporary occupation? Traditionally, the Midianites are considered to be a sedentary and a nomadic people in turn: settled in most of the eastern

Gulf, they regularly ascended to Moab to graze, while they were also involved in the caravan trade (Bonaccorsi, 1904a). Can we hope to find traces of habitation in the oasis, in upper levels or deeply buried under the alluvial deposits, or should we be satisfied with concentrations of ‘stone circles’, such as those found by the Comprehensive Survey and al-Ansary team?

A provincial city in long-distance commerce

Our data are more prolific and accurate for the following periods, especially for the classical and medieval eras.

Origin and development of a major caravan route

At the interregional level, control of a section of an important commercial (and later pilgrimage) route gave the oasis a place of primordial importance on the coastal road. Numerous questions arise concerning the modalities of trade, the means of transport and more generally the nature of exchanges, the controlling authorities or the kind of the products transited, as well as the stations along this route (see Livingstone et al., 1985: pl. 119; Ghabbân, 2011: map VII).

It is generally agreed that the oasis was part of the Nabataean kingdom in the first centuries BC and AD and that it contributed to the wealth of its people, as mentioned by Diodorus of Sicily. Together with Hegra

(Madâ’in Sâlih), Tayma’ and Dûmat (Dûmat al-Jandal), al-Bad‘ was undoubtedly one of the largest Nabataean cities of the time in north-western Arabia. The establishment of a caravan network on this third north-south axis, parallel to the Hegra-Petra road via Tabuk and to the Darb al-Bakra track (Ghabbân (al-), 2007: fig. 2), must have favoured the establishment of an extensive perennial settlement.

First of all, the question of the origin of this caravan route arises. The Nabataeans very probably settled on a trade route that already existed in the Iron Age, considering the ‘Midianite’ presence in the region. If such was the case, to the detriment of which political or tribal entities did Nabataeans take control of this route and probably of the adjoining territory? Was it still populated by the earlier Iron Age tribes in the area? Or had independent Hellenized populations already settled there? If so, how did this transition with the local populations take place: Were they integrated into the Nabataean population, part of its tribal heterogeneity? Did they retain traces of indigenous culture, or on the contrary, fully adhere to an exogenous way of life? Moreover, was this takeover the result of a gradual transformation linked to commercial exchanges and the cosmopolitanism peculiar to the Nabataeans, or was it an abrupt political decision?

We also have to wonder about the nature and the role of this trade route. If it was also used by caravans from South Arabia,

what was its *raison d'être* in relation to the other two parallel trade routes? Did it allow faster and more direct access to the Egyptian market? Moreover, if trade originated only from coastal ports, particularly Leuke Kome, what was the purpose of a half-maritime half-land route that did not serve the east coast of the Gulf of Aqaba, where the port of Maqna is attested? Was it related to specific security conditions (rivalries with Lagid powers), to market or topographical/maritime constraints?

Role and strategy of the Romans in the region

On a political level, it is necessary to question the consequences of the likely annexation of al-Bad' into the Roman Empire in AD 106, like the rest of the Nabataean kingdom. The discovery of a monumental Latin inscription by Parr suggests a permanent Roman settlement indeed in the oasis. What was Rome's strategy in the region during the decades and centuries following this event: Did they decide to continue using this coastal caravan route? Or to interrupt trade by the preferential use of the port of Ayla/Aqaba, explaining the consolidation of the Via Traiana towards Petra at the beginning of the 2nd century? Did this coastal route gradually dry up at a later date, as was the case with other caravan cities, including Hegra, and as the late coinage of the site seems to indicate?

According to the *Notitia Dignitatum*, there was no Roman garrison south of Ayla

(garrisoned by legio X Fretensis) around AD 400. Was the city militarily dependent on the latter in Byzantine times, or had Rome already disengaged from the region, preferring to create less dangerous alliances with local federated tribes, for example, the Judhâm? One of the objectives of the project will be to identify the evolution of the Roman economic and military presence in the oasis, in order to determine the Roman strategy in the region between the 2nd and 6th centuries.

A seat of a regional political and religious power?

With this in mind, it will also be necessary to examine the reasons for the permanence of a settlement in the oasis after the 1st century. Could it be simply because of the strategic position of al-Bad' at the regional level? Few other sites in north-western Arabia have such a density of settlement in Antiquity, while covering such a vast urban space and multifunctional archaeological areas, and bearing the title of the provincial urban centre.

With the monumental sculpted facade tombs, the presence of a large public edifice (a temple?) and that of a fort (?), this regional centre must certainly have enjoyed a strong influence on the surroundings. It certainly maintained close relations with the coastal cities of the Red Sea⁷ and also with the

⁷ The study of the port of 'Aynuna' by the University of Warsaw, conducted by Michal Gawlikowski since 2014, should help us to learn more about the caravan station that preceded al-Bad'.

main oases inland, including Hegra, Taymâ', Quarayya and Tabuk.

Unfortunately, the density of archaeological and epigraphic data around al-Bad' seems very limited at this stage and it is difficult to highlight the complexity of the connections and the interregional trade network in north-western Arabia in the absence of a detailed map (see Ingraham et al., 1981: pl. 66). The archaeological study will help to answer these questions in the near future.

Economic activities and natural resources

With the assumption that the oasis was not simply a large caravan station, it is also necessary to consider its natural resources and their roles in local, medium and long-distance trade. Philby mentioned the presence of turquoise not far from the site, which was confirmed by SCS. It is well known that Egypt was fond of this semi-precious stone, which was also produced in the Sinai Peninsula.

The geological map of the region also shows copper, iron and lead deposits to the west of the oasis, silver deposits about 50 km south-east, and some "rare elements" about 15 km to the north-east (Clark, 1987, Kisnawi et al. 1983). The location indicated seems to correspond with Wadi Maswat site, which, like J. Maqda Ar Rahyat is a gold mine. This mine probably dates to the Islamic period but might be older. Could this be an additional facet of the caravan station and provide some

sort of confirmation of the myth of Nabataean wealth?

Other economic activities were carried out locally, for example, quarrying of gypsum that was used to build the houses. Burton mentions, for example, the presence of "tall furnaces" (Burton, 1879: 92), perhaps used in the production of lime. The local economy could also have relied on a large agricultural area benefiting from the alluvial terraces. The palm grove and gardens provided food for the inhabitants of the oasis and commodities for bartering with traders and worse supplied neighbouring cities.

An ancient and medieval oasis with many faces

Distribution of urban areas

The study of the diachronic evolution of the functional spaces of the oasis will be a priority of our project. In particular, this work will rely on identifying the presence of ramparts on the archaeological sites. Philby mentioned, for instance, the mudbrick enclosure of al-Malha (Philby, 1957: 218). Is this a defensive wall, a protective barrier against the wadi, or is it simply a boundary around the urban space? While keeping topographic and natural constraints in mind, research into the rampart's layout would thus help to map the extent of the ancient city and to understand the interaction between the various sectors of the oasis.

Furthermore, do all the surface remains at al-Malha and Rudaydah really date to the Roman period? Occupation of the oasis during the transition from the classical period to the early Islamic period is based on fragile evidence (see for example Ghabbân, 2011: 201-203): was it continuous or was it interrupted once or several times? What are the reasons for the displacement of settlements east of the oasis during the Islamic period?

Agrarian and industrial products and areas

Today the oasis benefits from a large area of palm groves, mostly on the eastern bank of the wadi. Where were these agricultural areas located in Antiquity: to the east of the wadi, as suggested by the urban density in the area of al-Malha? Were there farms or villas in these areas? There is also the question of the location of the workshop and raw material processing areas. The area of Rudaydah has abundant ceramics on the surface, and could, therefore, be a good candidate for the craft activity zone. Pottery, both for domestic and commercial purposes, was probably produced in the oasis. Still, it is likely that some vessels also came from medium and long-distance imports, such as the painted eggshell wares, so characteristic of Nabataean production. The regional characteristics of pottery (fabric, decoration, production line, etc.) should be analyzed in comparison with the productions of the Petra region, as well as with those of the other oases of north-west Arabia. Will it then be

possible to recognize this provincial city as a manufacturing centre?

Study of the ancient necropolis and funerary practices

The necropolis deserves careful re-assessment of the field data. Despite its majestic character (Badaiwi, 2011), it remains unknown to the public and specialists alike. In 2015, Nehmé produced an initial synthesis of the tombs of al-Bad' pointing out certain characteristics, including the presence of benches to sit at the entrance to the tombs (Nehmé et al., 2015: 50-51). Many questions still arise: if the necropolis dates to the Nabataean period, it is necessary to give its precise date, its duration of use and to compare its architectural and technical aspects with those of Petra and Hegra. The range of burial techniques in the oasis must also be better defined. Pit graves are known from the southern part of the necropolis. It appears that there are also shaft burials (Nehmé et al., 2015: 50), and perhaps other types of graves. In short, how did funeral practices evolve at different periods of occupation of the urban sector? Moreover, is it possible to locate the Islamic necropolis?

Epigraphic Corpus

Unfortunately, the geological formations found in the oasis, be they gypsum or sandy sandstone, are not conducive to engraving: only five Nabataean inscriptions are known so far (Milik, 1972; Livingstone et al. 1985;

Nehmé 2003; Nehmé et al. 2015),⁸ while al-Ansary's surveys revealed only two rock-cut sites in the area in the Rait and Hajjiyya wadis some 50 km east of al-Bad'. More written attestations would enable us to learn more about the local deities in the Nabataean and Roman periods, especially through dedicatory inscriptions or even graffiti. To date, only one theophoric name, "Wahb'allāhī", has been attested in al-Bad' (Livingstone et al., 1985: 132, 141 [S108]; Nehmé et al., 2015: 52, n°4). The discovery of new inscriptions would lead to a better understanding of the relationship between the oasis and pastoral populations, but also to determine the characteristics of local scripts and languages as compared to those used in the southern Levant and northern Arabia. Hopefully, excavations should provide some answers, and perhaps even reveal the name of the ancient city: let us not forget that the very name of the oasis remains controversial: is al-Bad' oasis the Midian of the Old Testament, the Midian of Ptolemy or even that of Yaqu't?

Program of field research

In the context of a global study of the archaeological remains of the oasis, we have decided to establish a long-term multidisciplinary approach. The first stage

of the research program (2017-2021) necessarily involves the creation of a detailed and exhaustive inventory of the remains, in order to provide an accurate overview of the preservation of the oasis heritage for safeguarding purposes.

1. Inventory of ancient remains

Previous descriptions of the archaeological areas have provided only a partial and imprecise understanding of the ancient and medieval ruins in the oasis. Our inventory is therefore carried out using several complementary approaches leading to the establishment of a GIS (geographic information system) linked to a relational database on the archaeological remains (within the limits of a 15-km square study area that we intend to survey around the oasis). This work will aim to provide a definitive definition of the boundaries of the major heritage areas, and thus allow a file for its classification on the list of World Heritage of UNESCO to be drawn up.

The GIS of the site is built on QGIS. The database is regularly fed by field surveys and archaeological finds. Data can also be transferred to GIS from other topography software (including Autocad). The topography of each sector will be mapped from high-resolution aerial images georeferenced with a high accuracy Differential GPS (DGPS). This also allows the creation of several digital terrain models (DTM).

⁸ A sixth Nabataean inscription is mentioned by Philby (1957: 259; Nehmé et al. 2015: 51). A Dadanite graffiti was possibly discovered in the vicinity of al-Bad' (al-Ansary et al. 2002: 50-51, 124, fig. 35 [location error of fig. 37, p. 125]. Thanks go to Jérôme Norris for this observation).

Hydrogeological and geoarchaeological survey

Understanding the evolution of the landscape over time is an essential step in enabling archaeologists to produce a virtual reconstruction of an environment that has disappeared. This work involves a program of surveys and systematic drill cores with manual (and possibly mechanized) augers as well as a series of geo-archaeological trenches opened with a backhoe in uninhabited areas. It should lead to the creation of :

Detailed maps of the geological formations and hydrological data collected in the field in connection with the archaeological structures. This can only be done in parallel with the archaeological field surveys.

Cross-sections of the oasis to describe and delimit substrates and paleosols, to identify the periods of occupation of each area and to better understand the possible evolution of the hydraulic supply system.

Archaeological survey

The remote sensing study allows an initial inventory of the archaeological remains to be made. High-resolution orthophotogrammetry of the site will be used to identify and draw up surface structures, delineate the study areas and to create an extremely precise digital terrain model (DTM and DSM).

The remote sensing study is supplemented by a systematic archaeological field survey using a differential GPS (Trimble R4), particularly in areas not covered by high-resolution images but also during archaeological excavations, or to map ceramic concentrations. Beyond the oasis, in the vicinity of the site, GPS coordinates are taken using a manual GPS device with sufficient accuracy for this type of recording. It may occasionally be supplemented by a more accurate recording and georeferenced drone pictures.

A large-scale geophysical study of the main urban areas is also planned for next seasons. We are also planning to survey outside the fenced areas, in order to delineate the exact extent of the settlements, particularly in areas disturbed by modern dwellings or the destructive force of the wadi.

The GIS is complemented by a series of epigraphic surveys in the oasis and its surroundings. Probably little new epigraphic data will be found, due to the nature of the bedrock. Archaeological excavations will hopefully yield more textual information, especially in Nabataean (L. Nehmé), Greek and Latin (F. Villeneuve), perhaps also in North Arabian (J. Norris), particularly Thamudic. A specialist of Arabic scripts will be responsible for synthesizing the data from Arab-Islamic sources in order to reassess the geography and history of medieval al-Bad'.

Architectural study of the necropolis and analysis of funerary practices (Madafân Shu'ayb)

The study of the ancient necropolis by Badaiwi (2011) must now be completed by a complete topographical and architectural recording. The second stage consists of the systematic drawing plans and sections of the tombs and facades, using orthophotogrammetry. This research includes surveys of the graves cut in the flanks and hilltops of the necropolis area. Our objective will be to deliver a complete and definitive report on the architectural state of the necropolis and to compare this amount of information with the sites of Petra and Hegra. We do not foresee excavations in the necropolis of Mughayr Shu'ayb during the first stage of our work in al-Bad' (2017-2021). However, an anthropological research program should absolutely be planned in the future to improve our knowledge of funerary practices in the oasis.

2. Archaeological investigations in the ancient city and neighbouring areas

Initially, we plan to carry out extensive and stratigraphic excavations in parallel with field surveys. In order to characterize the periods and the modes of occupation specific to each area, geoarchaeological trenches will be opened with the aid of a backhoe. If structures with a significant heritage impact (such as a public building, workshop, etc.) are discovered during these explorations, we

will proceed with their extensive excavation.

The study of macro-organic remains (fauna and flora), pottery, coins, lithics, etc. will not be systematic but defined according to the nature of the deposit or the quality of the context. Archaeological artefacts found during surveys and excavations will be numbered (according to their layer of provenance), photographed, drawn and recorded in the site database. Depending on need, some archaeometric analyses might be carried out on sediments, objects and pottery. Note also that archaeological artefacts will be treated by conservators as required.

3. Scientific and heritage development

Field activities of an archaeological project are not limited solely to the acquisition of field data; care must also be taken of the totality of the structures revealed. Although all archaeological remains cannot be exhibited for tourism purposes, it is necessary to ensure the preservation of some exceptional archaeological features. This will provide visitors with a clearer picture and thereby a better understanding of the spatial organization of the ancient city.

The archaeological project will provide local authorities with detailed data on these activities (GIS, full reports, etc.) as well as technical expertise and recommendations on a regular basis to guarantee the success of our joint mission. The first recommendations

will obviously relate to the current state of preservation of the heritage in al-Bad'. Although it is still a small oasis, the demographic pressure is high. We know, for instance, that the number of inhabitants in the Tabuk region increases by 2.48% per year (www.citypopulation.de). Moreover, modern facilities are multiplying in the oasis of al-Bad', which has strong repercussions on the local heritage. Creating an inventory of the archaeological remains will, therefore, be the main objective of the first five-year program. Preliminary project data (GIS and photographs) will be provided to the SCTH on a regular basis. However, the final cleaned-up database will only be submitted after the end of the project. This will include the final GIS of the site and all the databases.

Results of the 2017 Season

Our 2017 survey aimed at clarifying the extension and nature of archaeological sites in the area. We present below an overview of our preliminary observations.

Pre-Nabataean remains at the site?

Our first surveys revealed traces of a fairly dense Neolithic presence in the area of al-Asifir (Plate 3.2). Forty-three stone structures and tumuli are possibly cairn tombs, but there are also remains of indeterminate circular features, sometimes very eroded, measuring between 2 and 10 m in diameter. The lithic tools collected in the field seem to be contemporary Neolithic productions

(Crassard, pers comm.).

The hiatus that followed was long, until the Late Bronze Age/Iron Age (known as the "Madianite period" in the past), and even that presence appears almost incidental for the moment; only some small diagnostic painted sherds (Qurayyah Painted Ware) were collected during previous surveys (Parr et al. 1970: 240; Parr et al. 1972: 33; Ingraham et al. 1981: 74–75, pl. 81, no. 4 [site 200-84], n°14 [200-82: Mughayr Shu'ayb], n°19 [200-81: Tayyib al-Ism]). Although no trace of this period was identified in 2017, a sample of dry twigs taken from an entresol in a stone building on the site of al-Qala provided a date which could testify to an Iron Age II occupation of that area.

One of the most significant results of our survey in 2017 is the (re)discovery of the archaeological area of al-Qala (Plate 3.3). Previously mentioned only by Burton in the 19th century (Burton 1879: 88–89), the site is a fortified promontory, the large upper terrace (100 x 60 m) of which, dominating the surroundings by a height of almost 60 m, is completely covered by stone structures. The settlement was protected by a fortification wall with a preserved segment about 12 m long consisting of perfectly jointed sandstone blocks along the edge of the cliff (Plate 3.3a). The remains of a dense occupation, composed of terraces and walls more than 1 m thick, extends perpendicularly to the eastern flank of the cliff and at the bottom of a narrow gully in the northern

face of the Jabal Safra massif. This gully, which stands above the bottom of the wadi, was hidden by the nearby promontory and provided a protected location with restricted accessibility. Small rectangular rooms and large quantities of cooking and storage wares testify to domestic activities in this area. The surface pottery seems to form a relatively homogeneous Late Hellenistic assemblage.

The Nabataean-Roman City

The Nabataean-Roman city consists of the archaeological sectors presented below; they are grouped logically according to topographic and chronological criteria. A large amount of late 1st century BC–4th century AD pottery was found in most areas, especially on the surface of the urban centre. Some areas (al-Burj and al-Malqata) showed evidence of Islamic occupation as well, by the pottery collected and the types of structure.

The urban centre

The main city developed in the central area of al-Malha on the west bank of the wadi and into part of the Mughayr Shu‘ayb area, from which it is separated today by an asphalt road (Plate 3.4a). Although we suppose a current area of approximately 26 ha (max. 850 x 300 m), it is likely that the south-west part of the site has been heavily damaged for at least 150 m to the south-west by modern installations. The site was previously mentioned by Musil (1926: 113) and described by Burton (1879: 88), Philby (1957: 217–219), Parr et al.

(1972: 33), and al-Ansary et al. (2002: 30–31). Today it is subdivided into two parts by a small wadi:

al-Malha North: the public area

This northern zone includes a large area to the east disturbed by a modern village, with a now-abandoned mosque with cement foundations (Plate 3.4a). This village, which stands on top of the ancient city, certainly deserves a dedicated architectural and geoarchaeological study, which would record the recent development of the landscape as well as the reuse of many large gypsum blocks. To the east of the village are modern cultivated areas with qanat shafts and several wells all aligned on a north-south axis on the west bank of the wadi. The extent of the overlap between this cultivated area and the ancient city has not yet been determined.

The western zone appears to be subdivided by an oblique N-S enclosure wall 200 m long which, to the north, joins what looks like a large tower. Immediately to the east of it stands an irregular rectangular structure, about 60 x 40 m, made of coral limestone blocks. It consists of a central courtyard surrounded by small rooms (Tell 1) (Plate 3.4b). Its identification is for the moment uncertain.

To the south of this structure is a large parcel of land that includes an undeveloped area on which are some recent Islamic tombs, and a large cistern (about 25 x 20 m) made of

granite blocks with a thick hydraulic coating (Plate 3.4b).

Further south, two large tells (2 & 3) seem to include monumental constructions. On Tell 2 (about 80 x 40 m) foundation walls form the outline of a barrack block composed of two rows of small contiguous rooms separated by a central corridor (Plate 3.4b). Tell 3 is even more imposing; standing partly on the conglomerate geological formation, there is a building with a succession of more or less square-shaped terraces to the north (Plate 3.4a). South of it, thick walls of uncertain function are still visible on the flanks of the tell.

Other long N-S and E-W walls have been identified to the west of Tells 2 and 3, perhaps in connection with a large rectangular construction located east of Mughayr Shu'ayb (Plate 3.5a). Although the eastern half of this latter structure was largely destroyed by the asphalt road, we can easily recognize the presence of a rectangular tower at the north-western corner of the building. The western section extends for about 42 m, to another possible rectangular tower. A 32-m-long segment seems to have been added in the same axis. According to an inhabitant of the oasis, the fragmentary monumental Latin inscription found by Parr in 1970 was discovered 200 m north of this building.

al-Malha South: the residential area

The southern part of al-Malha (Tell 4, c.

350 x 200 m) (Figure 4; Figure 7) was, until recently, extensively cultivated and used for breeding animals, as shown by many rectangular or circular structures with narrow and weak walls clearly visible on the surface east of the tell. We observed, in particular, a 190-m-long North-South oriented water channel in the centre of this area.

Below these scattered structures, the gypsum walls, which are more visible in the western half of the site, form the outlines of a residential area composed of houses with small rooms oriented to the cardinal points. Unfortunately, the western sector has been severely damaged by modern structures. An artificial section through Tell 4 suggests that some structures are preserved for a height of over 2 m.

At the south-western end of this tell, there is a circular mound 25 m in diameter, probably a tower, which may be marking the edge of the residential area (Plate 3.4a).

Secondary urban concentrations

Several smaller scattered settlements have been observed in the oasis, besides the site of al-Qala.

First, some concentrations of architectural remains were found in Rudaydah on the east bank of the wadi. This area is located on a natural gypsum and coral limestone terrace at the base of Jabal Safra, dominating the alluvial plain to its west by about 4–5 m.

At the time of Philby's visit, this site was covered with ruins of ancient buildings. Today, small, badly damaged stone walls have been identified in two places in its southern half. The better-preserved north-western remains indicate a crowded domestic structure consisting of small rooms oriented on an east-west axis, and perhaps the presence of a street (Plate 3.6).

Another concentration of ancient domestic structures appeared further north, bounded to the east by a 550-m-long enclosure and to the west by an 85-m-long wall, at the base of the gypsum terrace. Islamic tombs here cover a considerable area of the ancient remains. Still further north, a modern farm has been illegally set out, resulting in significant destruction of heritage. Another concentration of domestic buildings about 80 m in length appears further north towards the al-Qala, from which it is separated by modern cemeteries. This sector could correspond to the description made by Burton in the second half of the 19th century; he mentions a dwarf mound of dark earth and rubbish on the east bank of the wadi (Siyaghah sector, mint and smiths quarter), containing remains of ovens and many coins (Burton 1879: 91–92).

On the west side of the fortified promontory of al-Qala, a rectangular structure of 25 m per side, conceivably an official building, and many thick gypsum and mudbrick walls have also been identified (Plate 3.3c). This area and the rest of the Nabataean-Roman city seem to be distinguished from the eastern

side of al-Qala by the use of gypsum and by different types of structures and organization.

All these domestic areas east of wadi 'Afal may be linked to the presence of gypsum quarries. Three extraction zones with partially squared blocks still in situ were identified in 2017 at the base of Jabal Safra.

Second, on the west bank of the wadi, our visit of the northern part of a large elongated promontory in East al-Asifir, south of al-Malha revealed an ancient inhabited area covering about 180 m (N-S) by 110 m (E-W) (Plate 3.8c). Thick terracing walls of vast buildings made up of cobbles, some measuring nearly 20 m per side, stand on the summit and the north and east sides of an ancient alluvial terrace of the conglomerate.

The Nabataean necropoleis

The area of Mughayr Shu'ayb (site 200-82 in Ingraham et al. 1981), which contains the most ostentatious tombs, naturally received the most attention from previous travellers and explorers (notably Ruppel 1829: 219–220, Burton, Musil, Philby, etc.) (Plate 3.7). It runs for about 800 m along the eastern flank of a sandstone massif, Jabal Musalla. The Nabataean tombs with rock-cut facades (Philby's groups B, C and D) are located mainly in the southern part along a small defile by the newly established SETH visitors' centre. There are 34 monumental tombs (23 noted by Philby), two shaft tombs and 101 pit graves at the base of the massif

and on two small outcrops to the south-east. The space enclosed by metal fences situated immediately to the east of the tombs, inside the same area, up to the asphalt road, also contains some small archaeological tells and structures, possibly towers (Plate 3.4a).

Most monumental tombs (i.e. with a central door) have a central chamber, occasionally a second one on the side, with rectangular loculi cut into the walls and/or graves cut into the ground. One particularity of these tombs is the presence of stepped features and benches to sit on at their entrance (Nehmé et al. 2015: 50–51).

In the area of Mughayr Shu'ayb, only 8 tombs have a rock-cut facade with sculpted decoration, 10 have an undecorated facade and 16 tombs do not have a preserved facade. Most facades have suffered heavy erosion. Only those deeply cut into the rock are preserved. The decorated facades need to be studied in more detail during the next seasons. The decoration is composed mainly of frieze(s) of crow-steps. One tomb (T472) has a locally reinterpreted Doric order decoration (see also al-Suhaibani & al-Fawaz 2018).

The decoration and the general appearance of the facades are, without a doubt, less detailed and impressive than those of Hegra and Petra. One main reason certainly is due to the poor quality of the rock, as previously noted by Philby (1957: 220). It is a coarse-grained sandstone which does not lend itself to the

carving of fine decoration; this also explains the scarcity of rock inscriptions in the area (Milik 1972; Nehmé 2003).

The archaeological area of al-Asifir, which was in the past the south-eastern extension of Mughayr Shu'ayb, also has many tombs, although it has been badly damaged by the installation of a military base to the south (Philby's Group A; 1957: 257; Figure 10A-B). The western part of the area consists of an extensive sandstone layer on a green marl outcrop about 250 m in diameter, with three conical summits and delimited by an elongated crest to the east.

The tomb field extends over an area of approximately 520 m from north to south and 340 m from east to west. It includes the remains of one rock-cut tomb with a badly damaged facade without decoration and more than 475 pit graves, many looted. Dug in sandstone, they are rectangular and oriented either east-west or north-south. These pit graves are sometimes up to about 2 m deep and could accommodate several individuals on two (or more) levels. Of various sizes, some are for children or infants; pit graves were usually sealed by gypsum slabs, the contrast with the surrounding sandstone formation makes identification relatively easy. The necropoleis of al-Asifir (and Mughayr Shu'ayb) appear to have been protected by several towers located on the hilltops and possibly on the eastern boundary of Mughayr Shu'ayb (Plate 3.4a).

Another necropolis, covering an area of for over 400 m long by about 40 m wide, has been identified in Rudaydah, east of the oasis (Plate 3.4a). The necropolis, identified at this stage by a concentration of looting holes on the aerial images, seems to have been delimited on its western side by a previously mentioned north-south partition wall 550 m long. Several looted pit graves oriented east-west are similar to those of al-Asifir.

The ancient agricultural zone and the area of Islamic occupation

The location of the main cultivated areas seems to have slightly changed between Antiquity and today, an area estimated to cover about 300 ha. Today, the fields and palm groves stretch out along both sides of the wadi 'Afal, particularly on the east bank, south of Rudaydah, and to a lesser extent on the west bank opposite al-Qala. The presence of a water channel 460 m long, running north-south, with a thick hydraulic coating forming the bottom of the channel by binding large cobbles, seems to confirm that there must have been an extension of the agricultural zone further south, in the area of al-Adafa. It is in this sector that agricultural partition walls and several Nabataean sherds were discovered near an ancient unidentified structure, as well as a military diploma (small lacunary metal plaque with Latin inscriptions on both sides) mentioning an auxiliary soldier (F. Villeneuve, pers. comm.). This suggests the presence of Roman military detachments in the oasis and possibly of some local

administrations.

The sector of al-Malqata (Plate 3.6c) is the only one built in the middle of the valley's alluvial deposits. It was described by Musil (1926: 118), Philby (1957: 216–217) and al-Ansary et al. (2002: 36–37). According to al-Ghabban, who made two stratigraphic soundings here in the 1980s, the sector experienced three Islamic occupation phases between the 7th and 12th century (Ghabban (al-) 2011: 201–209, 321–330). Of considerable dimensions (220 x 330 m), the site has suffered the ravages of the wadi 'Afal and the construction of modern settlements. According to previous accounts, the area included houses with stone foundations, a rectangular cistern, a fort with circular towers and possibly a mudbrick rampart. A few painted eggshell sherds seem to confirm the extension of the cultivated area there during the Classical period.

Just 550 m north-east, the al-Burj sector, measuring 700 x 500 m, is thought to be the place where Moses drew water from the well and met his future wife, Jethro's (Shu'ayb) daughter (Burton 1879: 98–100; Musil 1926: 118; Philby 1957: 214, 216; Ansary (al-) et al. 2002: 31–36; Rashid 2003: 168–169). The remains are of three types: 1. The rock-cut well called Bir Sa'idni, was, in the past, surmounted by a stone installation, a kind of tower, according to Burton (Plate 3.6b); 2. A cistern with adjacent channels from the Islamic era, which was renovated several times, particularly in the Mamluk era; 3. A

Mamluk square fort, with a well-preserved elevation, is located to the north-east of the previous structures. It was recently excavated by Badaiwi (2014), as were some square structures near the water channel by one of his SCTH colleagues. Although no ancient remains have yet been found in the al-Burj area, there is little doubt that the well was already in use during Antiquity.

Final word

This preliminary image of the oasis needs much improvement and confirmation, which can only be achieved by further field research. The origin and exact chronology of each archaeological area need to be established, as well as the detailed settlement pattern of the city and the function of the defensive/craft and administrative structures. Landscape changes must also be better understood to clarify the evolution and nature of the human occupation. In particular, gaps must be filled for Prehistory, and the Bronze and Iron Ages. Moreover, we must try to answer, on archaeological grounds, the important question of whether or not al-Bad‘ was the famous capital of Madian, the supposed shelter of Moses. Other questions arise regarding the strategic place of al-Bad‘ in the Nabataean kingdom, its relationship with the harbours on the Arabian coast and its role in the Provincia Arabia under Roman and Byzantine rulers. Was the *raison-d’être* and prosperity of al-Bad‘ linked only to the ancient caravan routes? Did the commercial collapse in the 4th–5th centuries lead to the

end of the Pre-Islamic occupation in the oasis? At this early stage of our research, we can only affirm that al-Bad‘ was a major oasis in north-western Arabia, which has been forgotten for too long by scholars and the general public.

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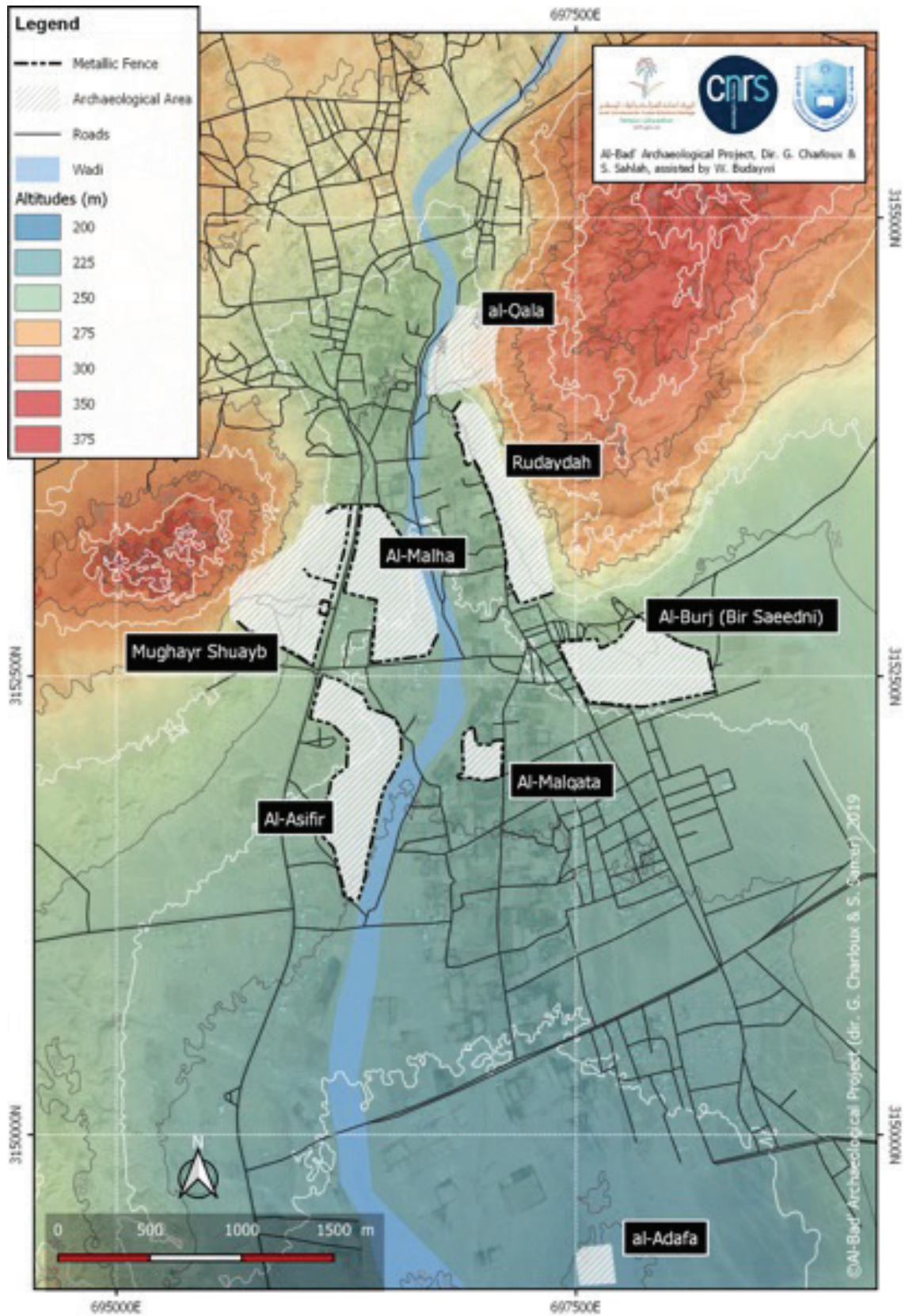
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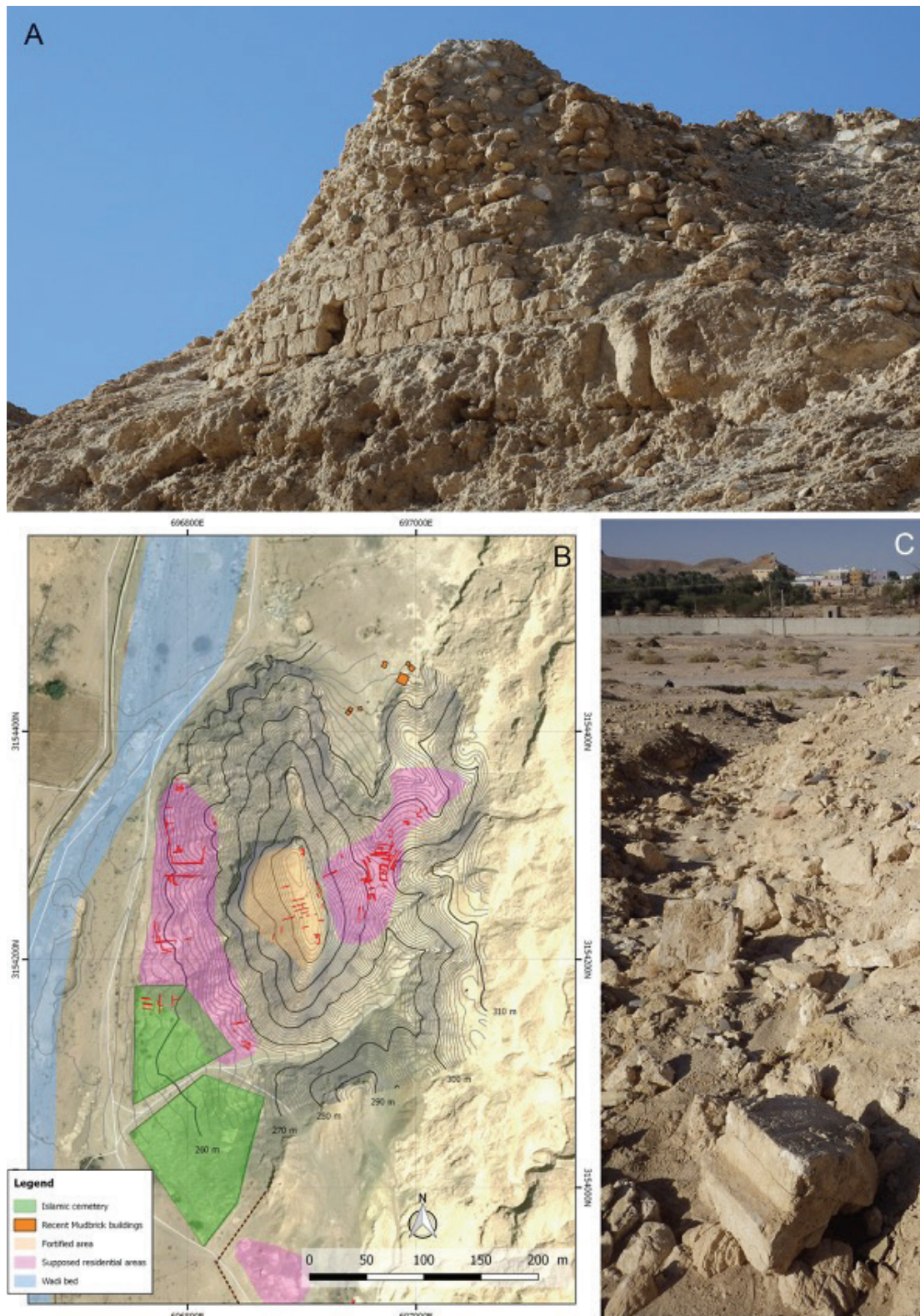
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القبور القديمة بمغايير شعيب.
The ancient necropolis of Mughayr Shu'ayb.



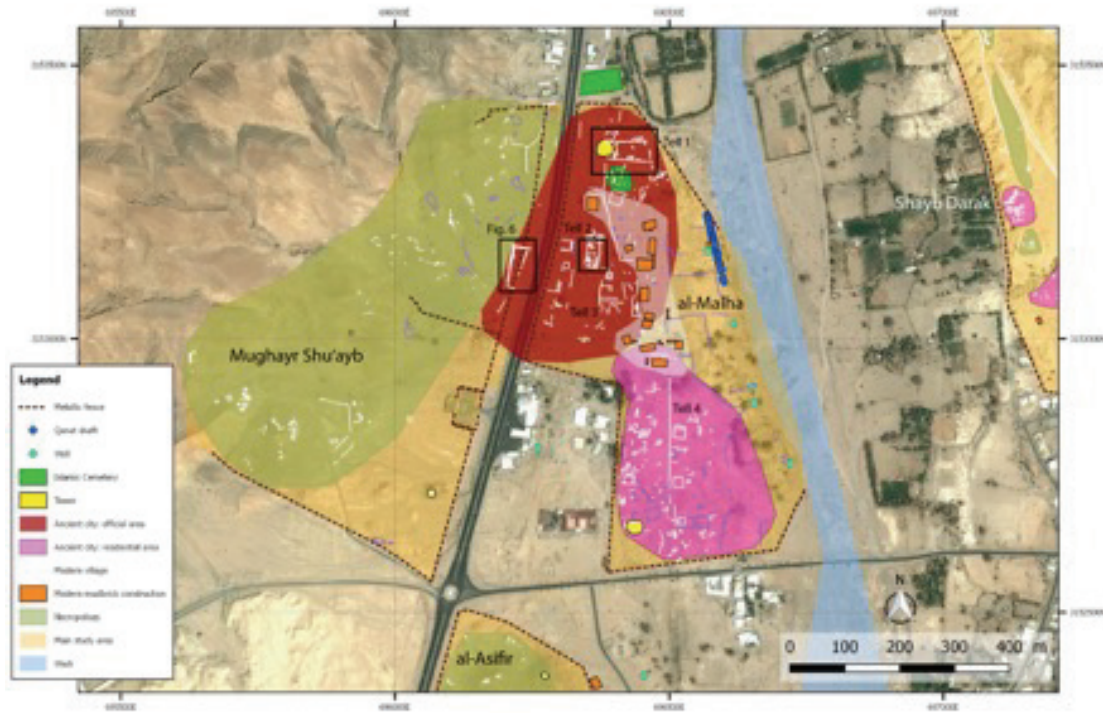
منظر عام لواحة البدع.
General view of the oasis of al-Bad'.



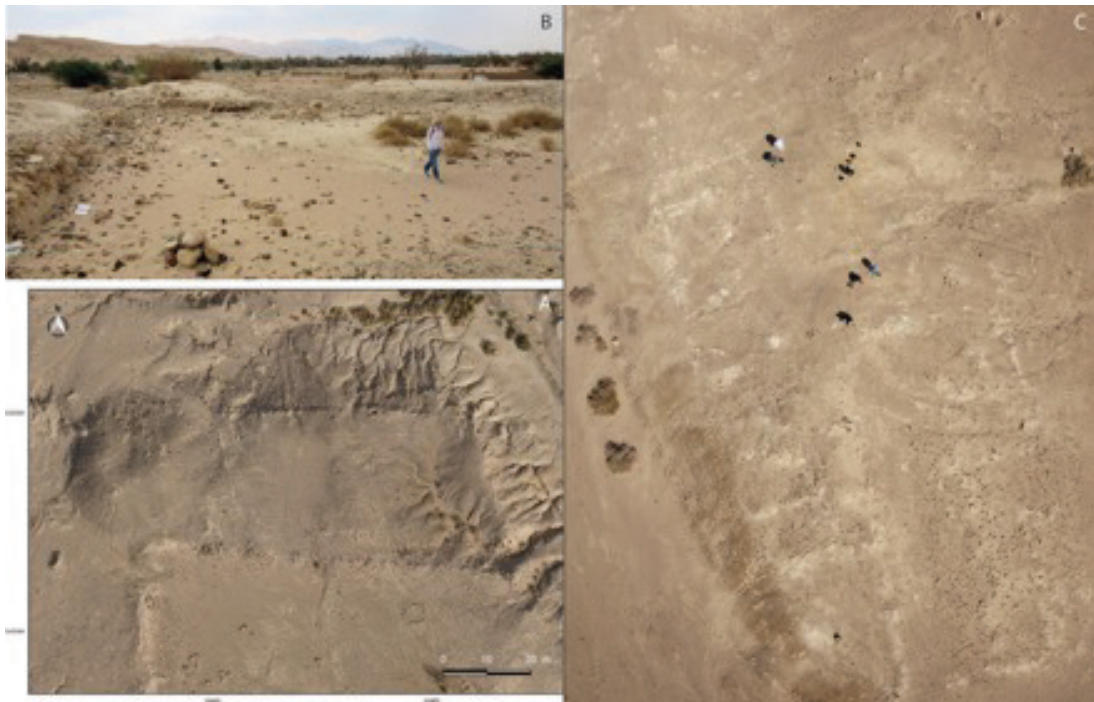
موقع القالة A: متراس من الحجارة على قمة الجبل.

B: خريطة المواقع الأثرية C: عصابة باب من الحجر كانت مبنى رئيساً في المنطقة الغربية.

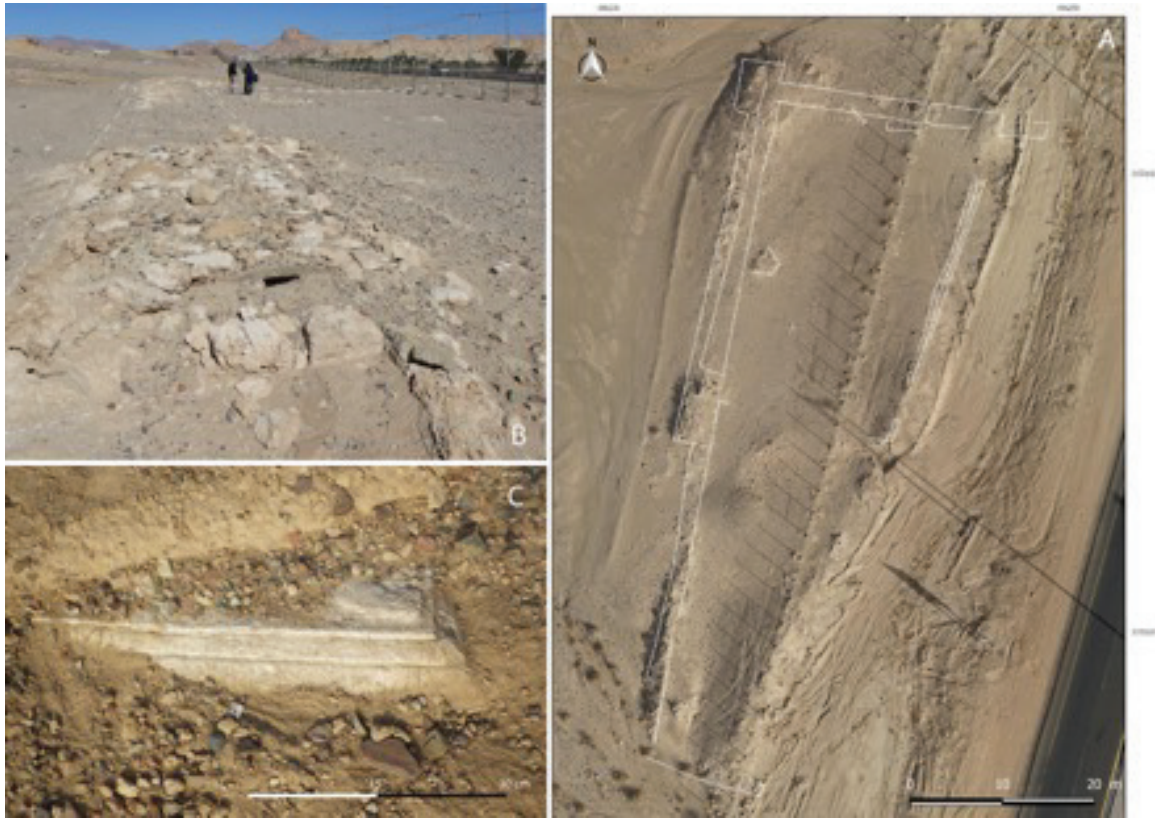
The site of al-Qala: A. Stone rampart on top of the hill, B. Map locating archaeological areas, C. Stone doorjamb belonging to an official building in the western area.



أ. خريطة الناحية الشمالية من المنطقة الحضرية (مغايير شعيب ومدائن صالح).
a. Map of the northern part of the urban area (Mughayr Shu'ayb and al-Malha).



ب. شمالي موقع المالحة A: مبنى كبير ويرج في شمالي المالحة.
B: خزان بشمالي المالحة. - C: بناء من الجبس ربما هو خان سامرين.
b. al-Malha North: A. Large building with a tower in the northern part of al-Malha (Tell 1), with a proposed reconstruction, ©BDAP, FalconViz, G. Charloux (drawing); B. Cistern in the northern part of al-Malha, ©BDAP, G. Charloux; C. Large gypsum construction (caravanserai?) from the air.



A. قلعة عسكرية محتملة تظهر خطوطها الرئيسية. B: جدران القلعة من الحجر - C: قاعدة من الجبس في مبنى عام.
 a. The possible military fort from the air, with main wall lines on the surface, ©BDAP, FalconViz, G. Charlux (drawing); B. Stone walls of the fort, ©BDAP, G. Charlux; C. Sculpted gypsum base of a public building discovered c. 150 m north of the fort).



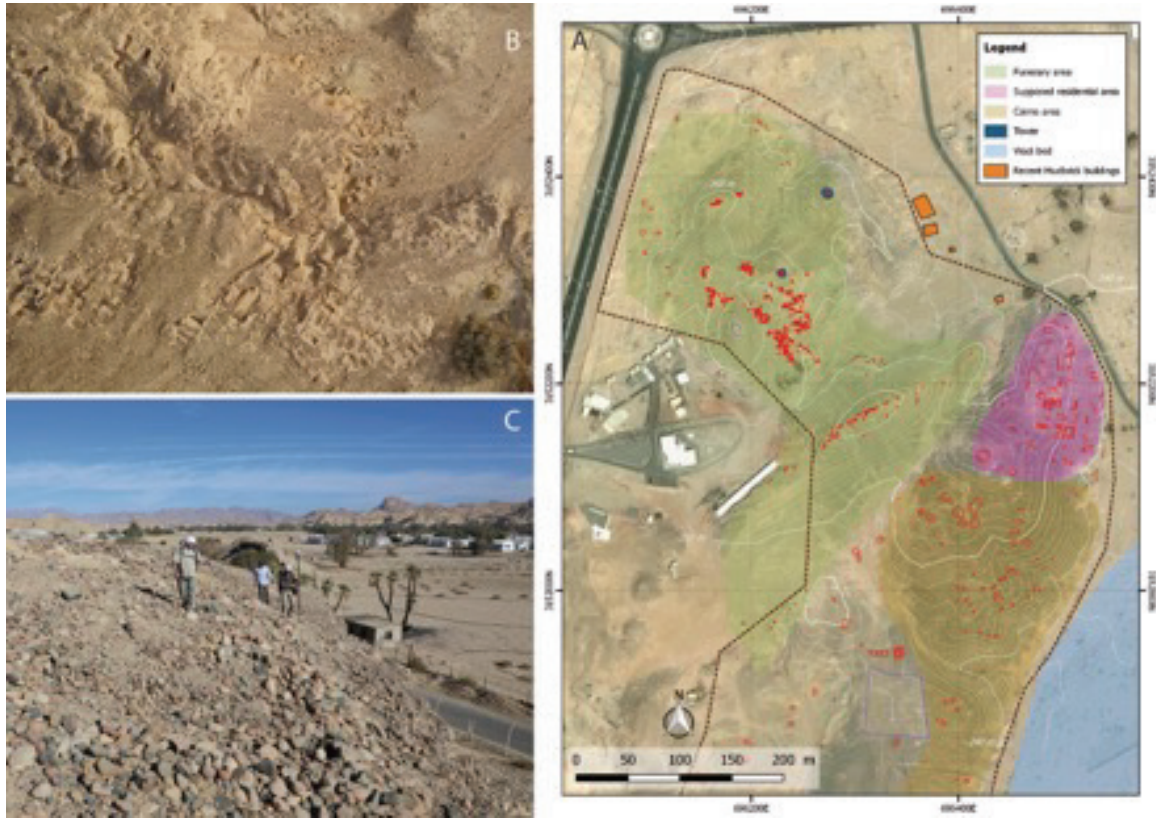
ب. صورة من الشمال الشرقي لموقع المالحة وتظهر المنطقة السكنية.
 b. Residential area in al-Malha South, looking North-East.



A: منشآت من الحجارة بموقع الرديدة. B: ما يسمى ببيئر موسى في البرج. C: جدار كبير من قلعة إسلامية بموقع الملقطة.
 A. Stone constructions in Rudaydah, ©BDAP, G. Charloux; B. So-called Moses's well in al-Burj, ©BDAP, G. Charloux; C. Large wall of the Islamic fort in al-Malqata.



مقابر نبطية بمغایر شعيب في البدع.
Nabataean tombs of Mughayr Shu'ayb at al-Bad'.



منطقة الأصفير A: خريطة توزيع المنشآت الأثرية - B: صورة جوية لأضرحة في العراء تعود للأنباط.

C: مسح أساسات حجرية على الجبانة الشرقية.

Al-Asifir area. A. Distribution map of archaeological structures, ©BDAP, G. Charloux on PLEIADES ©CNES, 2017, distribution Airbus DS; B. Aerial view of the Nabataean pit grave field, ©BDAP, FalconViz; C. Survey of large stone foundations on the eastern terrace.