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The Food Production Activities in the EB I Site of Jabal Al Mutawwaq: Evidence from the Settlement and the Necropolis

Introduction

The site of Jabal Al Muṭawwaq, located in the Middle Wādī Az Zarqā' Valley in Transjordan, has been under investigation by a Spanish-Italian expedition since 2012[1]. The site, dated to the Early Bronze Age I (EB I) is characterized by the presence of a walled settlement and a sacred area, as well as a huge megalithic necropolis outside the fence.

During the 10 years of excavations, several contexts have been investigated throughout the site with the aim of reconstructing the socio-economic organization and community ritual activity in a proto-urban period. Moreover, the presence of the settlement in association with the necropolis has allowed us to deeply investigate the dolmen phenomenon and to understand the relationship between the community and the ancestors.

One of the crucial aspects of community life was constituted by the food production and consumption. Analysing the identified contexts related to meal preparation, it was possible to collect several sources of information about the types of food the community consumed, allowing us to reconstruct how people exploited the landscape to grow the plants they needed and to breed the animals they used for meat and secondary products.

The Site

The site of Jabal Al Muṭawwaq is located on the top of a hill in the Middle Wādī Az Zarqā' Valley, and it reached a maximum of 18 ha during the two main phases of occupation in the second half of the 4th millennium BC (EB I) (For a general description of the site, see

[1] Jabal Al Muṭawwaq was first investigated by a Spanish expedition directed by Juan Antonio Fernandez Tresguerres Velasco from 1989 to 2011.

Fernandez-Tresguerres Velasco 2001; Polcaro 2019a; Polcaro/Muniz 2020a). The site was constituted by a settlement, surrounded by a wall, characterized by the presence of several domestic units, a sacred area (the Temple of the Serpents), and a community area (Area C). Outside the fence of the settlement, a huge megalithic necropolis extended over the entire surface of the hill (FIG. 1).

The Settlement

The settlement is constituted by a village enclosed by a perimeter wall. Around 200 domestic units have been identified and some of them have been investigated. The dwellings have an ovoid shape, consistent with the EB I tradition in the Southern Levant (For a description and an analysis of the domestic units of the period, see Braun 1989; Enea 1997; Golani 1999; Montanari 2012; Caselli 2020a). It is possible to observe that they are usually organized in clusters and in some cases a shared courtyard has been attested. Furthermore, three distinct sectors have been recognized, suggesting an internal spatial organization in the settlement.

The site had two main phases of occupation, the first one dated to Early Bronze Age IA and the second one dated to Early Bronze Age IB[2]. It is not easy to determine which portion of the site was used in the two distinct periods because the findings collected in the domestic contexts do not show a sharp differentiation between EB IA and EB IB. It is possible to affirm that, considering the dimensions and the number of dwellings, that the site could hold around one thousand people even if it is still difficult to determine if and how the site changed in size throughout the periods.

The Sacred Area

In the central area of the settlement, a sacred area was identified and investigated between 2003 and 2005 by the Spanish team (FIG. 2). The area, surrounded by a small wall that defined the zone dedicated to the cultic activities, was named "the Temple of the Serpents" because of the presence of several pottery sherds with snake applications, most of them placed on the shoulder of the vessels[3].

The area comprised the main building, House 76, where the rituals were performed, a complex of five rooms, and House 75. House 75 was divided into two rooms: one of them was characterized by the presence of a working stone table, several tabular scrapers and grinding tools, such as stone pestles and basalt querns, while the second one held a hearth. At the same time, in the five-room complex several storage jars were collected. These data suggest that House 75 was the place were food was prepared and cooked, while the five-room complex was dedicated to the preservation of the food for the community.

[2] The first phase of occupation of the site is dated to EBIA by the ^{14}C analysis performed on some samples collected in the 2019 campaign in the Great Enclosure (5470–5316 cal BP = 3521–3367 cal BC – Beta Analytic 576901); the EBIB phase is attested in the necropolis, in the Temple of the Serpents and in the domestic contexts (From Cave C.1012: 5190–5053 cal BP = 3241–3104 cal BC – Beta Analytic 561343; from Dolmen 11: 4980–4856 cal BP = 3031–2907 cal BC – Beta Analytic 576899; from the Temple of the Serpents: 5290–5040 cal BP = 3340–3090 cal BC – Beta Analytic 194526; from House 400: 5064–4870 cal BP = 3115–2921 cal BC – Beta Analytic 576900). The details about the analysis are reported in Polcaro and Muniz in press.

[3] The snake decoration is a recurrent feature in the rituality of the previous Late Chalcolithic sanctuaries and has been attested also in the later phases of the Early Bronze Age in the Southern Levant. For a description of the 4th-millennium cultic areas, see Sala 2008 and Caselli 2020b. For an analysis of the role and the significance of the snake in cultic contexts, see Polcaro 2019b.

The sacred complex was dated between the end of EB IA and the beginning of EB IB[4], suggesting that the area started to be used over the course of centuries and not in the first phase of occupation of the site.

Area C

Area C, under investigation since 2014, is located against the southern wall of the settlement on the southern slope of the hill. The main structure of this area is the Great Enclosure, a semi-circular open area of around 60 m in diameter (FIG. 3). A standing stone is located in an area surrounded by a massive wall (W. 102), which reaches a height of 1.5 m in its northwestern portion. The entrance to the area consisted of a megalithic door (D. 1110) that still preserves its jambs and lintel (Polcaro, Muniz, and Caselli in press; Polcaro and Muniz in press; Polcaro and Muniz 2020b).

During the 2019 excavation campaign, an interesting context was identified behind the standing stone. Here, a circular installation (I.193) was set in a sort of corridor engraved in the bedrock (FIG. 4). The installation consisted of a jar containing some food remains, and, under the vessel, other circular installations with some pottery sherds inside were identified. These data, together with the proximity to the standing stone, suggest the presence of a periodic deposition of food offerings with a cultic aim. The ^{14}C analysis performed on a burnt olive seed dates the context to 3521–3367 BC, corresponding to EB IA, the first phase of occupation of the site. The evidence of periodic ritual activities in the area, the presence of the standing stone, and the choice of a large enclosed open area, suggest that the Great Enclosure was a sacred area during EB IA, earlier than the Temple of the Serpents was built[5].

In Area C other structures are attested. In fact, toward the west, a complex comprising two buildings sharing a large courtyard (L. 51) was identified and investigated between 2014 and 2015 (FIG. 5). The western building was not excavated together with Building 131 and L. 51; it was investigated in the 2024 campaign and the collected data are under analysis.

The eastern structure, Building 131, was entirely excavated. It has an apsidal plan and two entrances, the larger one with the door socket still in place; it is the one related to L. 51. Close to the southern wall of Building 131, two large circular installations were found (I.58 and I.59). The installations, 1.8 m in diameter and 20 cm high, are stone lined and filled with levelled layers of small white rubble. They were probably dedicated to food production, but no organic remains sufficiently large for analysis were found. For this reason it is difficult to determine what kind of process was performed there.

Inside Building 131, two other interesting features were found: two cup-marks were identified (FIG. 6). The easternmost had a well-smoothed inner surface with raised edges, and was probably used as a mortar. The westernmost, located in the central portion of the room, was composed of a main hole with a smooth surface and the edge only partially raised and a second smaller hole with high raised edges. It is not possible to reconstruct the exact function of the two cup-marks, but probably they were used for some activities in relation to I. 58 and I. 59.

[4] The ^{14}C analysis performed on two olive seeds gave the chronology 3340–3090 BC and 3320–3220 BC (Fernandez-Tresguerres Velasco 2008).

[5] For a description of the EB IA open area sanctuaries, see Sala 2011.

The use of Building C and Building 131 for the preparation of food is confirmed by the characteristics of the shared courtyard, L. 51. In fact, in its northern portion, the courtyard bedrock rises in elevation, and small circular installations were carved in it (I. 65 and I.66). Those features were meant to host large storage jars (FIG. 7). In this case, such as described for the Temple of the Serpents, the production centre and the storage area are close to each other.

Area D (House 400)

Area D is located in the central sector of the site toward the north and comprises a well-preserved domestic building, House 400. The structure has been investigated by the Spanish team since 2019, and it was found sealed after the abandonment of the settlement at the end of EB I. The dwelling has an ovoid plan, consistent with most of the buildings in the site, and the two doorjambs are still standing. The relevance of this context is due to the state of preservation, which allowed the identification of several storage jars together with working installations and several grinding tools inside the dwelling.

Furthermore, the presence of a noticeable amount of burnt and unburnt olive seeds allowed us to hypothesize that activities related to the exploitation of olive trees were performed in House 400. The ^{14}C analysis on the olive seeds dated the use of the structure to the second phase of occupation of the site (3115–2921 BC), corresponding to EB IB[6]. According to the recent studies about olive exploitation in the Southern Levant, the increase of this kind of cultivation happened at the end of the 4th millennium BC, during the EB IB proto-urban period, and Jabal Al Mutawwaq seems to confirm this tendency, especially considering that most of the olive seeds at the site has been collected in archaeological contexts pertaining to EB IB, the second phase of occupation of the site[7].

The Southern Necropolis

The megalithic necropolis extended over the entire hill. During the last campaigns, excavations were focused on the southern portion of the necropolis, where the larger dolmens are located. In 2014, Dolmen 534 was investigated (FIG. 8). The structure was built directly against the southern wall of Building 131 and had an angular stepped corridor probably with the aim of preserving Building 131, which was still in use and related to food production activities. The dolmen was dated to EB IB because of the findings collected in it (Polcaro and Muniz 2018).

Dolmen 535 was investigated between 2016 and 2018 and was characterized by a large burial chamber about 2 m high (FIG. 9). In front of the stepped entrance, a beaten earth floor and a circular installation have been identified (Polcaro and Muniz 2021). The features seem to be related to some kind of food consumption, but the bad state of preservation of the layers does not allow us to reconstruct their exact function. Under these layers, a cave carved in the natural limestone was found sealed. The cave was used as a secondary burial chamber and miniaturistic vessels were the only grave goods of the burial. From the

[6] 5064–4870 cal BP = 3115–2921 cal BC—Beta Analytic 576900.

[7] For a description of the evolution of olive cultivation during the Early Bronze Age in the Southern Levant, see Sabatini 2019. Olive cultivation needs continuous care of the plants, and the development of this activity is strictly interconnected to the change of the relationship between men and landscape and the appearance of a megalithic funerary tradition at the beginning of the Early Bronze Age.

human remains recovered inside Cave C.1012 comes the ^{14}C date 3241–3104 BC, consistent with the second phase of occupation of the site.

During the 2019 campaign, Area EE was opened, and Dolmen 11 was excavated. It is located in proximity to the main southern gate of the settlement and to a water cistern. ^{14}C analyses performed in 2020 on human bones gave an age between 3031 and 2097 BC, EB IB, coherent with Dolmen 534 and Dolmen 535. Close to Dolmen 11, a standing stone (S. 1200) was identified, and in front of it, a carved stone bench, probably used as a working table. A cup-mark, probably a mortar, and several grinding tools were recognized (FIGS. 6 and 10). These data suggest that in front of the dolmen some productive activities were performed.

Building 1214

Area EE has been investigated since 2019, and in 2021, a building was identified close to the cave C. 1210[8]. During the 2021 campaign it was possible to investigate only a portion of the structure, its northern apse. In the last campaign, during 2022, the building was entirely excavated, and it appeared to be an interesting context pertaining to the production of food (FIG. 11).

The structure had an ovoid shape and measured around 9.30 m x 3.80 m, coherent with most of the buildings identified inside the settlement (Caselli 2020a). It is peculiar in its N-S orientation together with its location. In fact, it is located on the southern cliff of the hill in front of the Az Zarqā' River, in a prominent place visible from the valley, such as House 76 in the sacred area. Furthermore, House 76 has the same orientation as Building 1214, while many of the domestic buildings at the site has a E-W orientation.

Another crucial aspect is the building technique of the structure. It is preserved for a maximum of 2 m of height on the northern apse, and the presence of huge megalithic slabs in the walls is notable; one of them, located in correspondence to the door, measured 1 m in length and 1.75 m in height. The presence of megalithic slabs is not attested in the dwellings of the site, because it requires the effort of a large amount of people. These characteristics, together with the proximity of cave C.1210, of Dolmen 11, and S. 1200, suggested that Building 1214 was not private quarters, but that it was a community place with a specific function.

During the 2021 and 2022 excavation seasons under the upper layers, well-preserved layers were identified directly on the bedrock, the original main floor. In the northern apse two flat slabs were found (S. 1217 is the western one and S. 1218 is the eastern one) together with a cup-mark carved in a mobile stone block (probably a mortar) and two grinding slabs (FIGS. 6 and 12). The door of the structure was located close to the eastern slab. It was 1 m wide and lined with two stone jambs around 1.8 m high; the southern one was found collapsed on the floor. The door was raised at a higher elevation compared to the floor and three stone steps lead to the chamber (FIG. 13).

Between S. 1217 and the door, the discovery of a fragmentary holemouth jar was interesting. It was interpreted as a cooking pot because of the presence of intense traces of burning inside the jar (FIG. 14). This suggests that heated

[8] Cave C. 1210 was identified in 2019 in Area EE close to Dolmen 11. The cave was investigated, but it had been already emptied by modern looters. For this reason, it is difficult to reconstruct its exact function. For the results of the investigation, see Polcaro and Muniz 2023.

charcoal was disposed of inside the jar, used as a sort of portable oven, a fact that seems confirmed by the presence of charred animal bones beside the jar. The good state of preservation of the layers, in some cases protected by the collapse of the massive slabs pertaining to the walls, allowed us to investigate another interesting context inside the structure. In fact, in correspondence to the eastern wall of the building, a basalt stone strongly affected by fire was identified (FIG. 15). It is possible that this stone represented a base for a controlled fire, or to prepare the charcoal used in the cooking pot. Together with the animal bones, several seeds were collected. The analysis of the faunal and botanical samples performed by Perugia University will hopefully give precise information about what was prepared inside Building 1214.

The finds collected inside Building 1214 can be dated to Early Bronze Age I, and it can be surmised that the structure pertained to the second phase of occupation of the site because of its proximity to Dolmen 11, which was dated to 3243–3102 BC. New ^{14}C analyses will be performed on the samples collected inside the structure to confirm this hypothesis. Among the collected objects, the presence of several grinding tools is noticeable, such as pestles and basalt slabs. Furthermore, a high presence of Canaanite blades and bladelets has been observed (FIG. 15)[9]. Most of the pottery assemblage fragments come from preservation jars and holemouth jars.

The characteristics of the investigated context together with the presence of peculiar and specific material culture delineate a specialized function for this structure, linked to the preparation and consumption of food. Possibly, the building may have served to produce great quantities of food to be used on occasions of specific religious festivities, perhaps connected to the veneration of ancestors of selected important families of the settlement, coherent with its location in proximity to Dolmen 11 and the standing stone S. 1200. This last interpretation could explain the presence of a standing stone, usually a cultic architectural element, included in the wall of the building. However, the productive process can be clarified only after the completion of the analysis to be performed on the organic materials discovered inside the building.

Discussion

In order to reconstruct the food preparation and consumption of the Jabal Al Muṯawwaq community, it is important to distinguish the contexts pertaining to the first phase of occupation of the site and the ones pertaining to the second phase. Furthermore, it would be crucial to determine if there is a distinction between the food intended for domestic consumption and the food intended for public occasions.

At the site of Tall Al Mutasallim (Megiddo), for instance, the expedition team observed a difference between the animal bones pertaining to samples collected in the EB IB sacred area and the ones found at Tel Megiddo East, a town site. It was possible to observe that the faunal remains from the temple were young caprines that were consequently exploited mainly for their meat, while the majority of the faunal remains from the town site were adult caprines, suggesting that they were used mainly for

[9] Two Canaanean blades have been shipped to Italy with the aim to analyse them at Perugia University laboratories and to try to reconstruct their specific use in that context.

secondary products[10]. This aspect is precious to reconstruct the degree of complexity the society reached.

To better understand the society of Jabal Al Mutawwaq it is important to start from the first phase of occupation of the site. Concerning EB IA, the Great Enclosure is the most relevant structure because of its dimensions and its community function. Here, behind the standing stone, an important context for the reconstruction of food preparation and consumption at Jabal Al Mutawwaq was found (FIG. 16). Inside the jar placed in I. 193 there were some animal bones from a sheep. The deposition has been interpreted as a food offering because of the choice of the meat steaks, in particular the pelvis and the shoulder[11]. The presence of a food offering in a probable cultic area is notable, not isolated but related to a settlement in a phase (EB IA) during which the community was starting to settle permanently. The excavations suggest that periodic rituals were performed possibly in association with recurring economic activities by at least part of the population even if the society had not reached EB IB complexity yet.

The bones found inside the jar do not show any traces of burning, suggesting boiling as the cooking technique. The meal seems to be a sort of stew of lamb. The choice of boiling as the cooking technique can be related to the landscape peculiarities, such as the lack of substantial wood remains to produce sufficient charcoal but could also be due to the age of the animal. In fact, the boiling technique would be the best one to soften tough meat if the chosen animal was an adult[12]. This data fits with the interpretation of the EB IA community as still focused on pastoral exploitation and slowly reaching the complexity which would bring about the intensive agriculture phenomenon.

Another interesting aspect of the food offering found inside the Great Enclosure is the choice to put the installation in a corridor cut in the natural bedrock. It is not an isolated event; in fact, it is attested at Tall Al Mutasallim (Megiddo) in the same chronological phase (Wapnish and Hesse 2000: 444, 449; Adams, Finkelstein, and Ussiskin 2014: 291; Sapir-Hen *et al.* 2022: 216). In level J-2 (early EB IB) of the Temple area of Tall Al Mutasallim (Megiddo), a holemouth jar filled with bones from a single young sheep was discovered. It was not interpreted as a food offering because there were both burnt and unburnt bones. It was interpreted as a sort of deposit of debris linked to the cultic activities. At the same time, in the later layer J-4 in the Temple area, three narrow corridors have been identified filled with bone refuse and were interpreted as *favissae* linked to a ritual dimension of the discard process.

The relationship between the sacred area and food processing was probably essential for the Jabal Al Mutawwaq community, and it is remarkable that the Temple of the Serpents, which became the sacred area of the settlement after the end of use of the Great Enclosure, shows an increasing complexity in the

[10] For a detailed analysis about the evolution of animal exploitation in relation to the increase of the social complexity of the communities of the EBA Southern Levant, see Gaastra, Greenfield, and Greenfield 2020.

[11] The faunal remains are under analysis by the team of the Department of Veterinary Medicine of Perugia University. The team, directed by Prof. David Ranucci, identified clear traces of butchering on the bones after their cleaning and the removal of the compact layer of earth attached on their surface.

[12] Identifying the age of the animals is not an easy task in the case of the sheep bones discovered in the Great Enclosure because of the absence of long bones or teeth; sampling of animal ancient DNA is being undertaken for this reason.

management of food production with the erection of dedicated buildings: House 75 and the five-room complex.

With the development of the social organization at the site between EB IA and EB IB, several innovations in agriculture techniques were introduced, as testified to by the botanical samples. In fact, in the contexts from the second phase of occupation of the site (EB IB), several olive seeds (*Olea europaea*) were collected. Olive samples were collected both in domestic and in community contexts. For instance, a large concentration of olive seeds, both crushed and entire, was discovered in the house of Area D, in the funerary hypogeum connected to Dolmen 535 and in the structures inside the temple area. These results confirm that at the site olive growing became a crucial economic activity, underlining that Jabal Al Muṯawwaq had become a permanent settlement because olive cultivation needs a planned, well organized, agricultural landscape and constant care to fulfil large productive purposes. This aspect fits perfectly with the historical context of proto-urbanism during the last two centuries of the 4th millennium BC, well attested in the whole Southern Levant (Sabatini 2019).

It is possible to affirm that olive cultivation was carried out, but the data collected up to now are not sufficient to be sure that the community of Jabal Al Muṯawwaq produced olive oil. The circular installations inside Building 131 could be interpreted as a sort of olive press system in association with the two cup-marks, which could be used to crush olives to prepare the paste. The lack of clear evidence of this activity does not allow us to confirm this hypothesis.

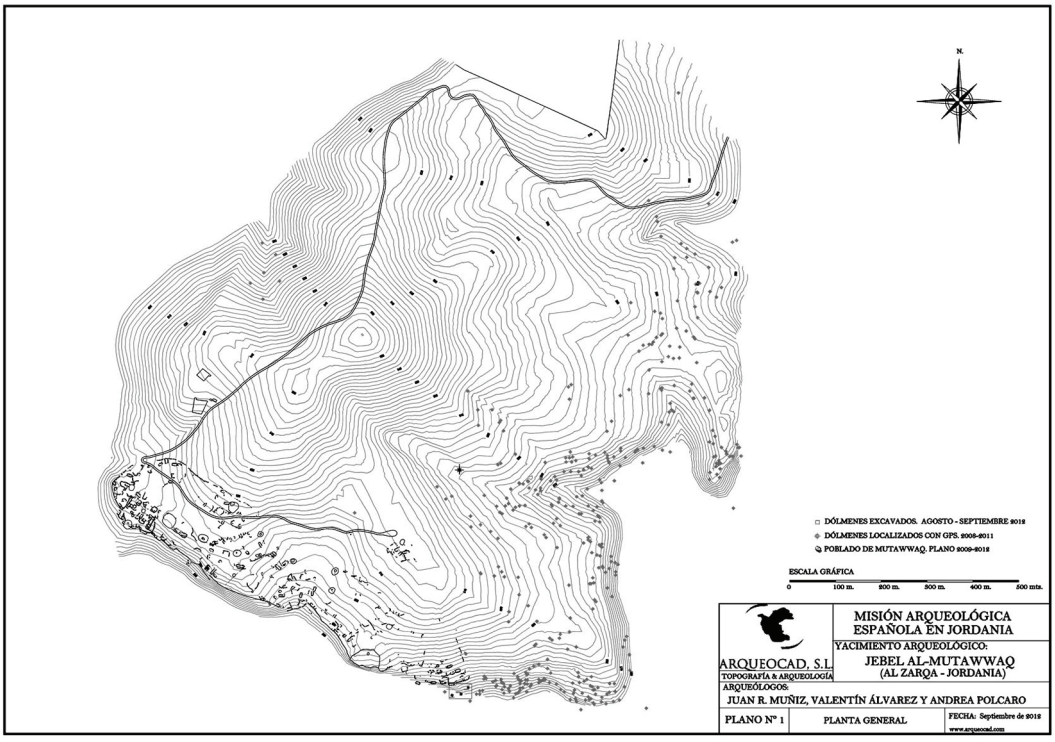
Furthermore, the cup-marks themselves could have different interpretations. During the 2019 survey campaign at Jabal Al Muṯawwaq, for instance, it was possible to identify different types of cup-marks characterized by distinct shape, depth, and location (FIG. 6). The shape and the other characteristics of these features are related to their function. In some cases, such as the ones inside Building 131 and the one inside Building 1214, the discovery context facilitates the interpretation of these features as mortars, supported also by their characteristics and shape, though what organic material was processed inside them is still not totally clear[13].

An important aspect to delineate the role of the food preparation in the EB IB Jabal Al Muṯawwaq society is the connection between food and funerary rituals. The dolmens in the southern necropolis are located in proximity to the main southern gate of the settlement, suggesting the practice of periodic cultic activities linked to the celebration of the ancestors of the families who had built those monuments. The presence of food installations related to the three dolmens that have been investigated so far (534, 535, 11) confirms this hypothesis. In particular, Building 131 (in connection with Dolmen 534) and Building 1214 (in connection with Dolmen 11) suggest the preparation of a large amount of food for these kinds of rituals. The exact type of food prepared with this aim is still not clear, but hopefully the analysis of the botanical and faunal remains collected inside Building 1214 during the last campaign will give useful results to reconstruct which kind of meal was prepared for these occasions.

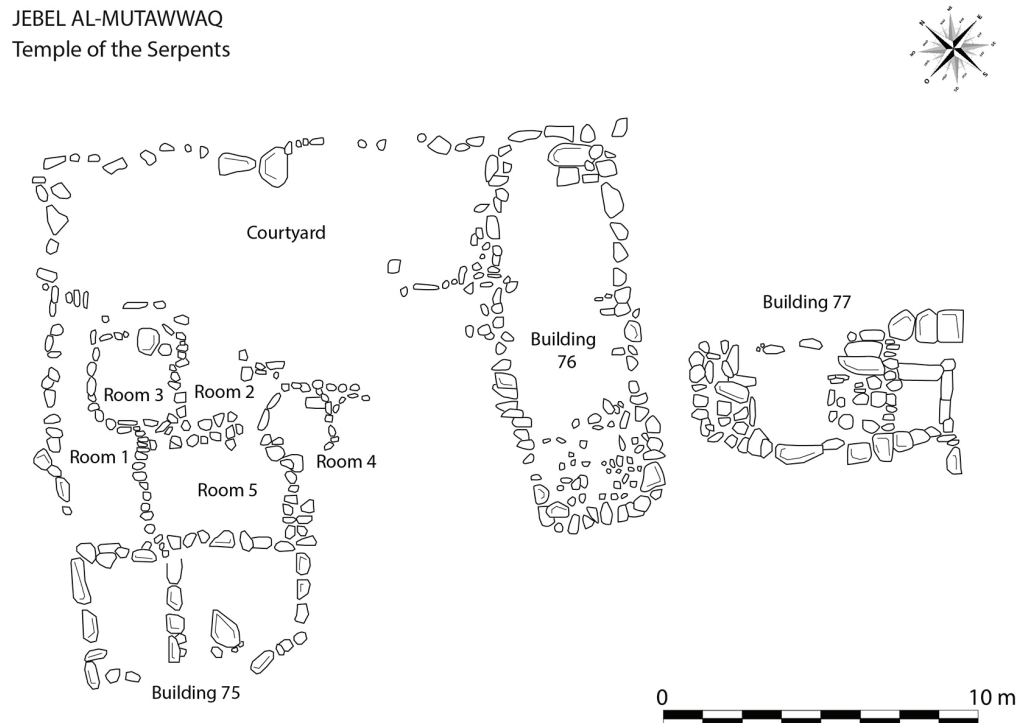
The increasing complexity of the rituals performed together with the enrichment of the variety of food

[13] For the description of the different typologies of cup-marks identified at Jabal Al Muṯawwaq see Caselli 2023. For a proposed interpretation of the cup-mark inside House 76, see Polcaro 2019b.

remains throughout the first and the second phases of occupation of the site is evidence of the development of Jabal Al Muṯawwaq from a large village to an urbanized society at the very beginning of the 3rd millennium BC, before its abandonment occurred around 2900 BC.

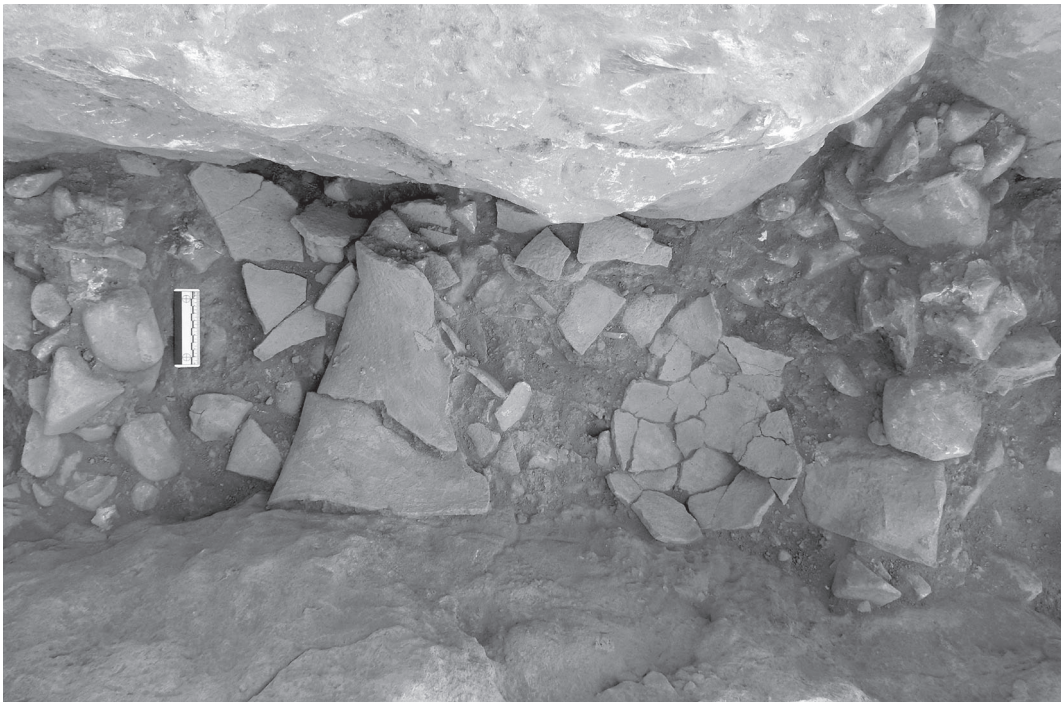


1. Topographical map of Jebel al-Mutawwaq (image by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

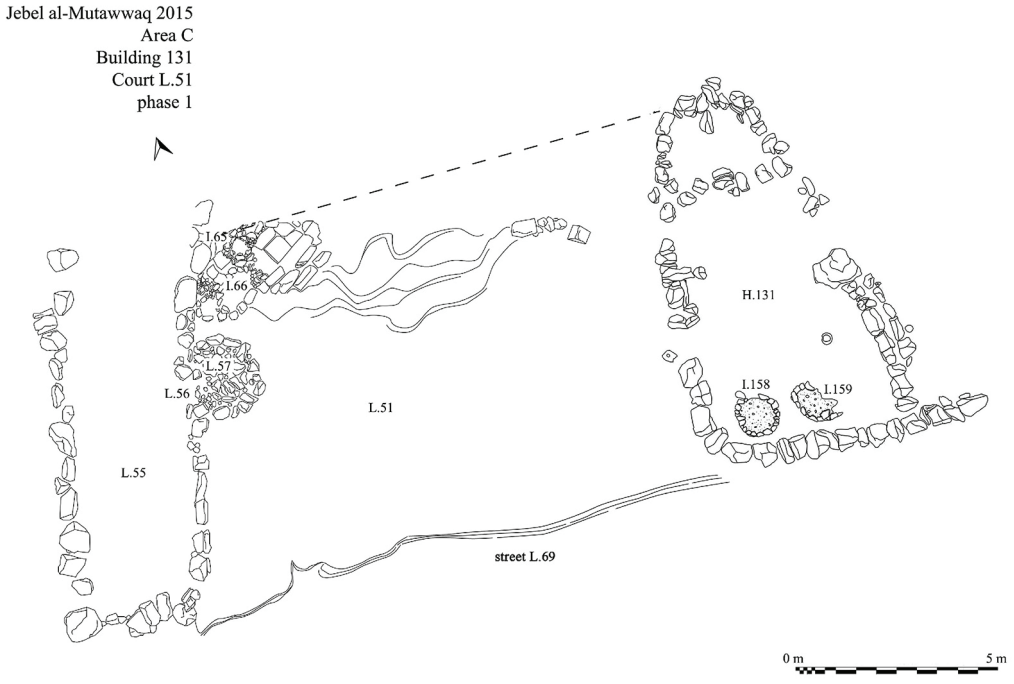


2. Plan of the sacred area, the Temple of the Serpents (image by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

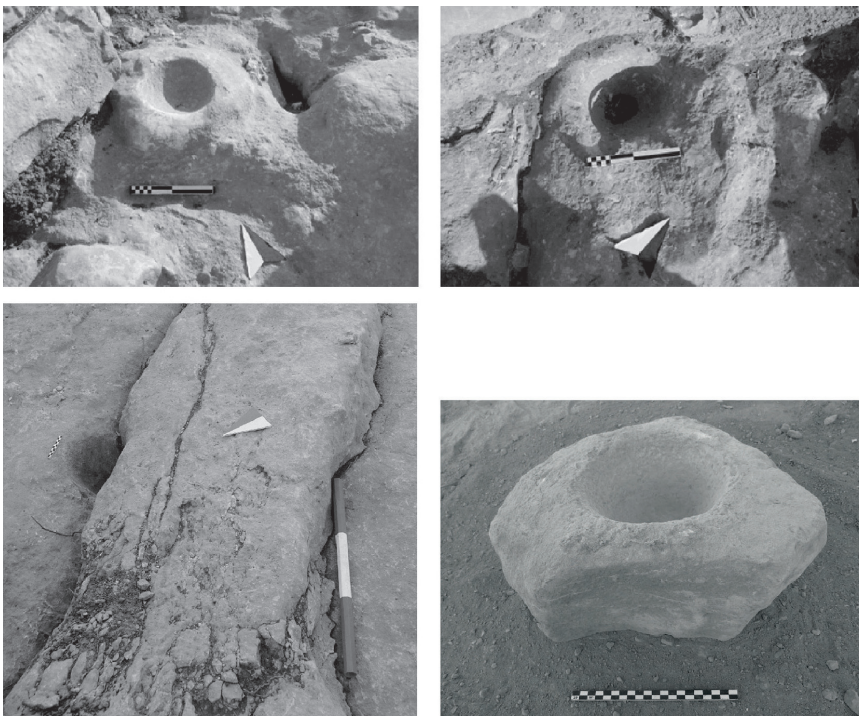
3. The Great Enclosure. The standing stone is visible (photo by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).



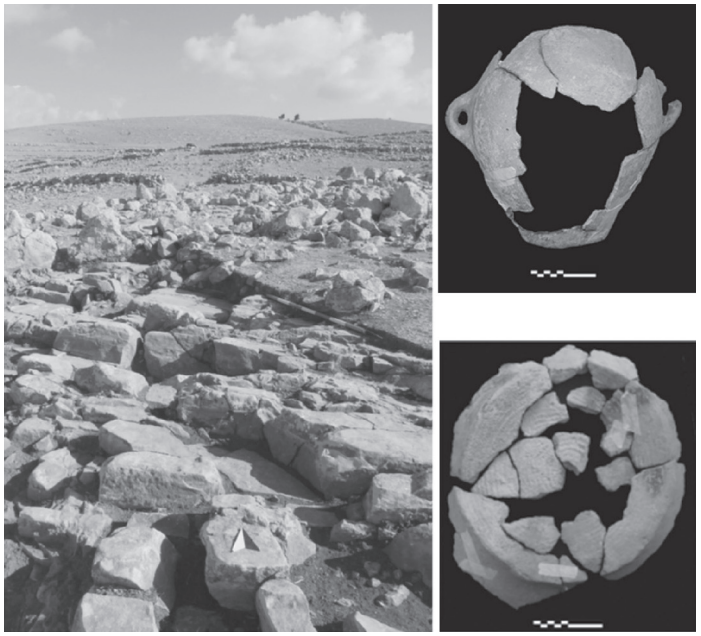
4. Circular installation I. 193 placed in a corridor carved in the natural rock against W. 102 (photo by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).



5. Plan of the first phase of Area C (Building C, Building 131, and the courtyard L. 51) (image by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).



6. Some examples of cup-marks identified at Jebel al-Mutawwaq: the two cup-marks inside Building 131 (on the top), the one close to Dolmen 11 together with the stone bench carved in the natural bedrock (on the bottom left) and the cup-mark carved in a mobile stone rock found inside Building 1214 (on the bottom right) (photos by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).



7. The northern portion of the courtyard L. 51 and two examples of the storage jars placed inside I. 65 and I. 66 (photos by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

8. Dolmen 534, a general view from the north (on the right) and its angular access (on the left) (photos by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

9. Dolmen 535 and the access to the cave C.1012, a capture from the 3D model (photo by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

10. General view of Dolmen 11 and standing stone S. 1200 (photo by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

11. A general view of Building 1214, Area EE (photo by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

12. The stone slabs inside Building 1214 (S. 1217 and S. 1218) and the mortar CM. 1222 (photo by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

13. The stepped entrance to Building 1214. The megalithic slab inserted in the wall of the building is visible (photo by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

14. The jar discovered inside Building 1214 with traces of burning on the inner surface (photo by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

15. The basalt stone strongly affected by fire found inside Building 1214 (on the top) and one almost complete Canaanite blade (on the bottom) (photos by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

15. The basalt stone strongly affected by fire found inside Building 1214 (on the top) and one almost complete Canaanite blade (on the bottom) (photo by the Spanish-Italian Expedition to Jebel Al-Mutawwaq).

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