KHIRBET AL-BATRAWY

An Early Bronze Age Fortified Town in North-Central Jordan

Edited by LORENZO NIGRO

with contributions by
KHALED DOUGLAS, BILAL R. KHRISAT,
LORENZO NIGRO, ANDREA POLCARO and MAURA SALA

ROME 2006
«LA SAPIENZA» EXPEDITION TO PALESTINE & JORDAN
ROME «LA SAPIENZA»

EXPEDITION TO PALESTINE & JORDAN
ROME «LA SAPIENZA»

STUDIES ON THE ARCHAEOLOGY OF PALESTINE & TRANSJORDAN

UNIVERSITÀ DI ROMA «LA SAPIENZA»
DIPARTIMENTO DI SCIENZE STORICHE ARCHEOLOGICHE E ANTROPOLOGICHE DELL'ANTICHITÀ
SEZIONE VICINO ORIENTE
EXPEDITION TO PALESTINE & JORDAN
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GEOARCHAEOLOGICAL INVESTIGATIONS AT KHIRBET AL-BATRAWY

Bilal R. Khrisat∗

The fortified settlement of Khirbet al-Batrawy is situated within the northern highlands geomorphologic province on the top of a limestone plateau, where the main physiographical units are the moderate and high rocky and desert hills, adjacent to the Wadi az-Zarqa, and within the up-throw of the major geologic Amman-Hallabat Fault Zone. The settlement is elevating about 665 m AMSL. It raises from the surrounding landscape about 100 m in the north-eastern part and more than 150 m in its south-western part at the bank of the Wadi az-Zarqa. The Wadi az-Zarqa is branched by several lateral wadis running mainly westward from the central Eastern Jordan Ridge (fig. 1). Human occupation in Upper Wadi az-Zarqa shows evidence of continuous cultural occupations; geomorphic evidence indicates that some climatic changes and other human factors have led to migration and abandonment of several sites and sub-drainage systems of the wadi itself.

The study area belongs to semi-arid climate marginal Mediterranean-type climate, characterized by a hot and dry summer and cool winter with short transitional seasons predominating in the northern, central and western parts of the region, while the eastern and southern parts of the study area have a semi-arid to arid climate especially in moving to the east. Winter begins around mid-November and summer begins around the end of May. Rainfall occurs mainly during the winter months with an average annual rainfall of about 160 mm, which are strictly falling during the winter months (fig. 2). The falling rainwater flows into the narrow and relatively deep rocky drainage pattern. Temperature also varies across the study area, and generally the average daily temperatures for January range from about 7 to 11 degrees Celsius (°C), whereas, in summer, the average temperature is about 24 °C. The original steppic vegetation is scarce at present and the surviving green pockets of the destroyed natural vegetation suggest a kind of overstress conditions and deterioration of the green cover in the area that could have resulted due to long and extensive overgrazing and agricultural activities along the Zarqa river banks. At this stage of our study we have not come across clear evidence for the water management in the EB city. However, the presence of the Wadi az-Zarqa in the site vicinity must have provided a perennial water source.

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Fig. 1 - Geological and geomorphic map of the site of Khirbet al-Batrawy.

Some of the cavities within the limestone formation must have served as good storage features for water with some modification. Such cavities can be seen in the western part of the city (fig. 3; see also above p. 12, figs. 1.13-1.14).
Further investigations need to be made in this direction supported with the upcoming evidence from the excavations to give more explanation to this part of the EB city.

Geologically, the exposed limestone formations display layering on many different scales, ranging from few centimetres thin clay layers in a hand specimen to massive layers that crop out along the north eastern part of the site plateau side. The limestone formation exposed in the site is mainly belong to the Hummar, Shua'yb and Wadi As Sir formations\(^2\). Layering within the limestone formation reflects many different sedimentation processes but with common characteristics. These parallel strata in the limestone inherited the gentle, flat-lying surface that might reflect the

\(^2\) Abu Qudaira 2004.
character of their original depositional environments. The exposed limestone formations are made of thick-bedded to massive limestone in the middle and lower parts of the formation, sometimes interbedded with chert veins and fossiliferous beds (fig. 4).
A clear section of the local lithology is well represented at the deserted modern stone quarry sections in the north and north-eastern parts of the site. A generalized map of the geology of the research area is provided in figure 1. On the other hand, the upper appearance of the limestone formation is made of blocky limestone with sedimentary structures known as desiccation cracks and characterized by vertical and horizontal joints network system developed due to structural deformation of the limestone. The orientations of the joint system in the plateau suggest the dominance of the NE-SW direction (figs. 5-6,a); this might help in looking for the subsurface features at that direction, especially water cisterns and tombs. Furthermore, the structural characteristics of the uppermost layers, apart from being useful tools for interpretation of ancient environmental settings of the limestone, were utilized by the local inhabitants to easily detach limestone blocks for the constructions in the site. This is also evident from the blocks preparation at the site, where very less workmanship and finishing can be observed on the building blocks, such as the one in the fortification wall (fig. 6,b). The limestone forms a distinctive geomorphologic unit with step slopes and cliffs of batched grey-weathering colours limestone intercalated locally with soft marly-limestone and marl. The interbedded marlstone occurs as a hardened rock consisting of a mixture of clay, mud, sand, and an abundance of calcareous material, mostly shell material (fig. 4). It sometimes exposes as erosional cavities along the slopes and in the wadi beds. These deposits have been sampled for the clay analysis. The presence of fragments of the local chert within the pottery clay suggests a local production of pottery; however, by waiting for results of the scientific analyses of both the pottery and clay sources, as well as in the absence of any pottery kilns or any production units at this stage of the research, this suggestion will be based completely in the visual assessment of the available clay and the recovered pottery from the excavations. Further sampling and study will be conducted in the coming seasons for more detail analyses of the raw materials used by the site settlers and reliable data for interpretation. The study of the landscape and land use of the site supported by the recovered cultural materials from the excavations will shed more light in understanding how the Early Bronze Age inhabitants fitted into and viewed their surroundings. It is also equally important to know how the settlers designed and utilized their landscapes, which often reflected their lifestyles and socioeconomic patterns more accurately.

3 See above § 4.2.2.
Fig. 5 - Rose diagram summarizing the joint system characteristic of Khirbet al-Batrawy plateau.
In a macro level, the study area is geomorphologically marginal and erosional in nature, dissecting the limestone formation by the Wadi az-Zarqa and its catchments tributaries. This resulted in erosional landscape dominantly represented by steep and rounded striped hills of Upper Cretaceous limestone. These hills sometimes elevating in their maximum to about 880 m at the western part of the study area.

Viewing the site from the north-western side, the EB city is situated on the top of a nearly flat plateau gently sloping toward northeast at about 5°. The plateau has a commanding view in the north-west, west, south-west and south directions. The surface of the plateau is interrupted with many gently dissecting channels draining to the north-eastern side of the plateau (fig. 7). The plateau is an isolated one except in the north-western part of the settlement, where it is connected through a ridge by another elevated series of plateaus. This ridge is the only easy natural accessibility to the city and it could have been used by the settlers as the main pathway to access the settlement. In most of its directions and sides, the city plateau is characterized by steep irregular slope broken into steps-like features. The intersecting of the nearly horizontal bedding plane of the limestone formation with the perpendicular vertical joint system at slopes surface have resulted in rough slopes interrupted with vertical cuts that break the slope into several ridges forming steps-like landscape surface, which have not only stabilized the plateau slopes but also makes the plateau slope serve as an ascending natural defence in climbing into the site (fig. 7).

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4 See above § 1.2.1., fig. 1.18.
Remarkable stone hillocks are dominating the eastern sector of the settlement *plateau*. These small stone hillocks accumulations are formed by the collapse of limestone architectural blocks. The presence of these accumulations of stone masonry at this part of city is logical evidence that might indicate the collapsed of a huge architectural structure (fig. 8). This also might indicate the importance of this part of the city for the inhabitants and support the natural accessibility point to the city. Although most of the used stones are made of limestone, objects made of basalt, chert, granite and sandstone have been retrieved. The exposed outcrops within 3 km diameter from the site are made of limestone, hence the provenances for other raw material need to be mapped and sampled. Though erosion is the characteristic geomorphologic process in the study area, at the base of the many vertical fissures of joint system of the limestone formation, many depositional localities and lenses of clayey marl have developed. Some of these localities in the vicinity of the site were investigated and sampled for provenance analyses of the pottery and clay artifacts of the settlement. The growth of plants within these fillings is an easy indicator for their locations. The natural clays which are found in the vicinity of the site show some amount of chert micro flakes and broken fossils, which are the product of the local limestone weathering.
In the next season we hope to conduct intensive systematic survey and sampling of the exciting raw materials around the site. Remote sensing and GIS tools will be used to locate and map the sources of the different raw materials available to the site and the different human modifications of the surrounding landscape which are potential for the site location. The preliminary survey has already identified several locations in the south-western and north-western slopes of the settlement and along and near the bed of the Wadi az-Zarqa. These locations are different in size and include terraces, hill slopes and stone exposures and accumulations, possibly exploited for agricultural purposes during the site occupation. One of the remarkable land use of the site is the presence of large stone quarry nearby (fig. 0.4). Fortunately, this quarry was deserted few years back, but erased some of the north-eastern part of the site plateau and the southern part of the northern plateau. From the reconstruction of the plateau slope from the quarry remaining parts, it is clear that the slope in the north-eastern part of the plateau was very steep and broken as the one
on the western side of the plateau (fig. 9), which suggests a natural defensive morphology of the plateau at this side of the plateau too.

Fig. 9 - Reconstruction of the quarried part of the plateau based on the original remains of the plateau seen at the left hand of the picture.

Future Geoarchaeological Work
The preliminary results we are presenting at this point of research clearly point to a more detail geoarchaeological investigations in the micro and macro levels of the site. Promising archaeological evidence has been recovered from the site, at the present state of knowledge a major Early Bronze Age centre in the valley; decoding the different sub-phases of its palaeo-environmental history is, thus, the goal of future geoarchaeological work. By means of most significantly defined short-terms geoarchaeological research steps, we hope to generate permanent records of the different geo-related materials and analyses of the site; to understand how the site relates spatially to its surrounding natural and cultural environment; to define settlement pattern and communication of the different human
groups in the area; to test proposed development models and conservation strategies of the site; and, finally, to help and facilitate monitoring and management of the site itself. Hence, the primary task of our geoarchaeological future work in the site will be both a contextual analysis at the micro scale and the identification of behaviourally meaningful site.

References


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See Premise §§ 0.1., 0.3.