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Hunter-Gatherer Art at al-Kharrānah IV

Abstract

Artistic objects are thought to be one of the hallmarks of the Natufian period, marking a florescence of artistic behavior appearing prior to the origins of agriculture. However, with continuing research into Early and Middle Epipalaeolithic sites in the Levant, new discoveries of 'symbolic' artifacts are increasing our understanding of even earlier artistic and symbolic pursuits. In this paper we present an engraved plaquette from the Middle Epipalaeolithic context of al-Kharrānah IV in eastern Jordan. Using imaging confocal microscopy, we analyze manufacturing traces to identify the gestures and tools used to create the plaquette. This artifact, although the only engraved piece recovered from al-Kharrānah IV thus far, links into wider networks of Epipalaeolithic interaction and cultural exchange. Placing the al-Kharrānah IV engraved object into regional context with other Early/Middle

Epipalaeolithic artistic artifacts, we explore wider networks of interaction prior to the Natufian.

Introduction

Artistic objects are thought to be one of the hallmarks of the Natufian period, marking a florescence of artistic behavior appearing immediately prior to the origins of agriculture in Southwest Asia. However, with continuing research into Early and Middle Epipalaeolithic sites in the Levant, new discoveries of 'symbolic' artifacts are increasing our understanding of even earlier artistic and symbolic pursuits. In this paper we present an engraved plaquette from the Middle Epipalaeolithic occupational phase of al-Kharrānah IV in eastern Jordan. This engraved plaquette is the oldest 'art' object in Jordan from *in situ* cultural deposits. Using imaging confocal microscopy, we analyze manufacturing traces to identify the gestures and tools used to create the plaquette. This

artifact, although the only engraved piece recovered from al-Kharrānah IV thus far, demonstrates important links with wider networks of Epipalaeolithic interaction and symbolic and cultural exchange.

Art in the Epipalaeolithic

The 20,000 or so years spanning the Epipalaeolithic period (EP; *ca.* 23,000–11,500 yrs BP) in Southwest Asia is characterized by a wide diversity of hunter-gatherer behaviors and lifeways. Broadly subdivided into Early, Middle, and Late phases, much research is devoted to understanding the complicated, non-linear transition(s) from hunting and gathering in the early and middle phases towards more settled village life and food production in the Late or Natufian phases (Maher *et al.* 2012). The Natufian period in the Levant is notable for a proliferation of stone architecture, burials with grave goods, and symbolic artifacts whose abstract and figurative designs are thought to represent a flourishing ‘artistic’ repertoire (Bar-Yosef and Valla 2013). Early excavations at Natufian sites from the region uncovered extensive cemeteries and artifact-rich sites with numerous stone-built structures and associated features. Many of these sites also revealed elaborately carved objects in stone and bone, such as the famous ‘Ain Sakhri lovers’ figurine (Boyd and Cook 1993), leading researchers to believe that the Natufian culture represented complex hunter-gatherers at the threshold of agriculture (see summary in Bar-Yosef 1998). In contrast, earlier Epipalaeolithic hunter-gatherers were seen as being more mobile, having more ‘simple’ social structures, and by comparison rather lacking in symbolic material culture (*e.g.*, Goring-Morris and Belfer-Cohen 1998). However, recent and ongoing research in Southwest Asia is providing clear evidence that Early and Middle Epipalaeolithic lifeways were rich and complex, with increasing evidence for

human burials in association with habitation, long-distance trade networks, and symbolic artifacts.

We recognize here that the term ‘art’ in reference to prehistoric artifacts with decoration, adornment, embellishment, designs, or other seemingly ‘non-functional’¹ modifications is highly problematic (Conkey 1987, 1997; Bednarik 2003; Nowell 2006, 2015; David and McNiven 2017). The dichotomy between utilitarian objects and artistic pieces is not culturally universal in the present or in the past. While an object may have aesthetic value, the distinction that an artifact was created purely for aesthetic purposes is a modern concept (*e.g.*, the concept “art for art’s sake” was developed and used by a variety of artists and philosophers in the mid-19th century). Although here we describe an artifact from al-Kharrānah IV that has aesthetic properties and no clear utilitarian function, and thus we call it ‘art,’ it does not mean that other more ‘everyday’ objects from the site did not have aesthetic or symbolic value. As well, the incised plaquette from al-Kharrānah IV might have had a utilitarian function that eludes us. Until recently, distinctions were often made between the ‘rich’ artistic world of the Upper Palaeolithic of Europe and comparatively art-poor contemporary groups elsewhere (Boyle *et al.* 2010 and references therein; McBrearty and Brooks 2000 for counter arguments). However, many have also critiqued assessments of what this Upper

¹ We also draw attention here to the long-standing archaeological debate between the roles played by style and function in material objects (Wobst 1977; Sackett 1982, 1990; Wiessner 1984; Conkey and Hastorf 1990). While we make a distinction here between modifications to materials that relate to their operation/use for an intended physical task, such as cutting or sawing or piercing, and modifications to materials that relate to changing their symbolic, social, or ideological value, we recognize that many visual alterations to objects, alterations that might be termed as decoration, do indeed have important social and ideological ‘functions.’

Palaeolithic cave and portable art ‘means’ to the people who created it (Nowell 2006, 2015; Nowell and Chang 2014; Fritz *et al.* 2016). Despite the obvious lack of cave art in Southwest Asia, figurative and abstract art is found at sites dating back at least to the Middle Palaeolithic (d’Errico and Nowell 2000), albeit rare through much of the Palaeolithic and Epipalaeolithic (d’Errico 1992; Goring-Morris and Belfer-Cohen 2002). Here, too, our understanding of the ‘meaning’ of these objects, art or otherwise, remains elusive.

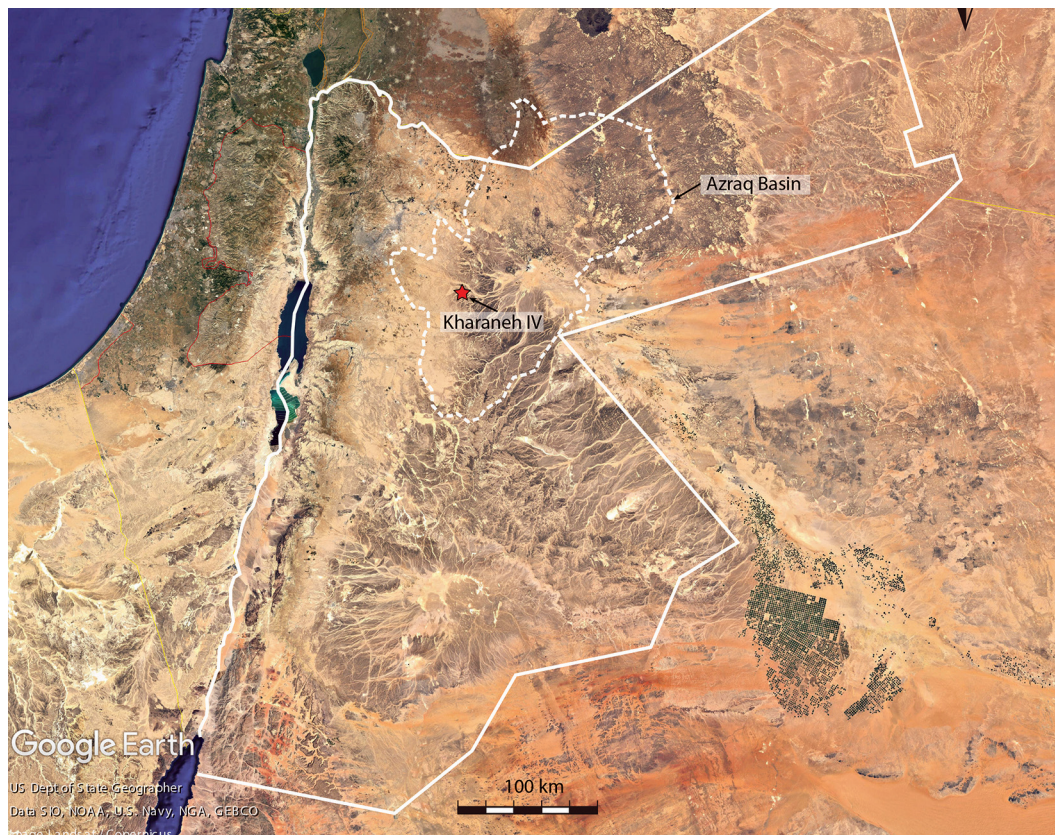
Although artifacts ascribed as ‘art’ are known from several pre-Natufian sites, they are uncommon in the Epipalaeolithic archaeological record. One of the earliest discovered pieces was an engraved limestone pebble from the Early Epipalaeolithic Kebaran site of Urkan e-Rubb in the Jordan Valley (Hovers 1990). This piece is decorated with a series of ‘ladder’ motifs and parallel lines. Recent discoveries at the Middle Epipalaeolithic site of ‘Ayn al-Kassīs (Ein Qashish) in the Marj Ibn ‘Āmir (Jezreel Valley) uncovered three engraved objects, all made from limestone (Yaroshevich *et al.* 2016). Two of the pieces have geometric designs, including ‘ladders’ and chevrons, while one has a figurative bird design. Other artistic representations include two incised chert nodules from the Geometric Kebaran site of Neve David in Israel (Kaufman *et al.* 2018), a modified chert nodule from the Geometric Kebaran levels at Wādī al-Maṭāḥah in southern Jordan (Gregg *et al.* 2011; Macdonald *et al.* 2016), and a stone with a ladder motif from the Early Epipalaeolithic site of Wādī al-Maqdamah (Byrd 2013). On several of these pieces, including the objects from ‘Ayn al-Kassīs (Ein Qashish) and Urkan e-Rubb, ‘ladder’ motifs and parallel lines are present, suggesting the possibility for shared artistic traditions. We discuss this motif and its possible significance in terms of information exchange or sharing below.

The Early and Middle Epipalaeolithic Site of al-Kharrānah IV

Adding to this small, but growing, corpus of pre-Natufian Epipalaeolithic art, we introduce here new findings from the aggregation site of al-Kharrānah IV. al-Kharrānah IV is located along the western margins of the al-Azraq Basin in eastern Jordan (FIG. 1). Radiocarbon dates suggest the site was occupied between 19,830–18,600 cal BP, chronologically and typologically spanning the Early and Middle Epipalaeolithic periods. Detailed technological analyses of the chipped stone tool assemblage from the deepest trench on-site, matched with radiocarbon dates, ascribe these occupations to Kebaran and Geometric Kebaran cultural groups (Macdonald *et al.* 2018).² It is the largest Epipalaeolithic site in the region at approximately 21,000 m², marked clearly on the desert landscape as a small mound of accumulated artifacts with a surface pavement of chipped stone tools and debris. Figure 3 shows the boundaries of the site, partially delineated by a barbed-wire fence and by a recently-built low mudbrick wall designed to unobtrusively prevent vehicular traffic over the site and protect the prehistoric deposits from destruction and minimize erosion. The site’s large size and dense artifact accumulations indicate that it was a hunter-gatherer aggregation locale during occupation and a focal point for interaction in the region. Several seasons of excavation at the extremely well-preserved deposits at the site corroborate its intensive and complex settlement history.

Al-Kharrānah IV sits at the confluence of two river valleys, which are currently dry in the summer but exhibit seasonal flooding during wet winter months. Although

² Debates on the use of these terms as markers of social or cultural identity have been discussed elsewhere and will not be reviewed here (Richter and Maher 2013; Maher and Macdonald 2020).



1. Map showing the location of al-Kharrānah IV in relationship to the al-Azraq Basin.

the modern environment around al-Kharrānah IV is that of an arid to semi-arid desert, extensive geomorphological work at and around the vicinity of the site allows us to reconstruct a local Pleistocene paleoenvironment that was substantially different than that of today. Waterlain sediments, ostracods, and water-dependent flora and fauna studied from several off-site geological trenches and on-site excavation pits reveal ancient wetland and playa lake deposits immediately surrounding and episodically inundating the site (Jones *et al.* 2016a, 2016b; Martin *et al.* 2016; Ramsey *et al.* 2016; Henton *et al.* 2017). It seems that the occupants of al-Kharrānah IV had ready access to several permanent and semi-permanent water sources, and indeed,

it is likely these would have contributed greatly to making it an attractive habitation locale 20,000 years ago. The history of archaeological work at the site has been discussed in detail elsewhere and will not be reviewed here (Maher and Macdonald 2020). The Epipalaeolithic Foragers in Azraq Project commenced excavations in Area A in 2008, re-opening an area noted by M. Muheisen to contain horizontally extensive Middle Epipalaeolithic (Geometric Kebaran) deposits during his initial work at the site in the 1980s. He noted the presence of pits, possible hearths, and post-holes accompanied by dense concentrations of chipped stone and faunal remains (Muheisen 1988a, 1988b). The renewed excavations in 2008 quickly re-located his original

trench here and extended horizontally from it to discover well-preserved, stratified Early and Middle Epipalaeolithic deposits (Macdonald *et al.* 2018). We focus here on excavations in the Middle Epipalaeolithic Area A relevant to the discovery of the stone plaquette.

The material culture from the Middle Epipalaeolithic deposits is extremely dense. The majority of material is chipped stone tools and associated debris, and the lithic assemblage includes a range of geometric microlith types typical of Middle Epipalaeolithic assemblages. Muheisen (1988b) noted several types of geometric pieces, namely ‘variant’ trapeze forms, atypical to most Geometric Kebaran sites; however, our analysis of a large assemblage of these and comparison with contemporary sites elsewhere in the region suggests the wide variety of geometric types noted here likely relates to some combination of aggregation and dispersal movements and information exchange between mobile hunter-gatherer groups (Maher and Macdonald 2013, 2020). Large accumulations of fauna suggest that the Middle Epipalaeolithic inhabitants of the site preferentially targeted abundant local gazelle populations, but also hunted a wide array of other species, such as aurochs, wild ass, fox, hare, tortoise, waterfowl, and migratory birds (Spyrou 2019).

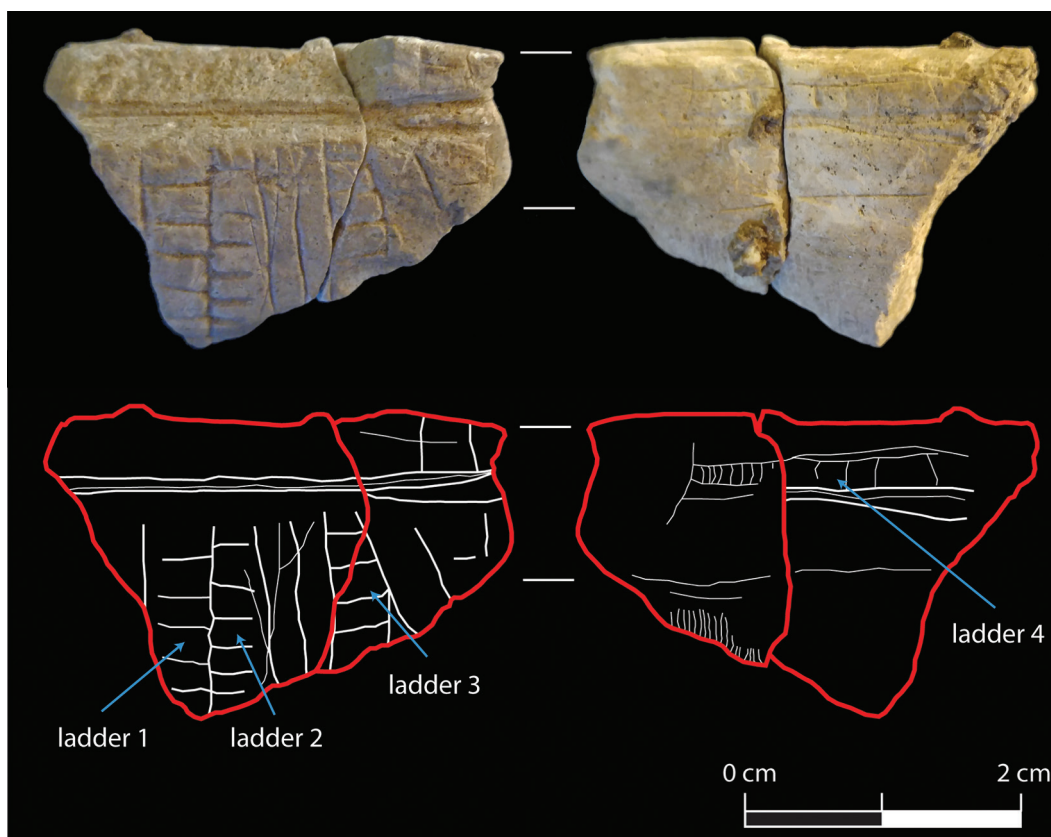
In addition to this material evidence of occupation, there is also a wealth of symbolic artifacts at the site. This includes thousands of perforated marine shells, imported from the Mediterranean and Red Seas, up to 200 km away, and likely used as personal ornamentation or decorations on objects like bags or clothing. More than 50 pieces of engraved or otherwise modified animal bone have been recovered from al-Kharrānah IV. These bones are usually fragments of long bones, ribs, or mandibles, from medium-sized mammals like gazelle and large animals like aurochs. These pieces exhibit repeated ‘motifs’ consisting of a

series of parallel notches incised along one edge or surface, forming regular, continuous, or clustered patterns. The large number of perforated shell beads and notched bones indicates a rich expression of symbolic material life.

The Incised Plaquette from al-Kharrānah IV

Perhaps the most unique object discovered so far at al-Kharrānah IV comes in the form of a small engraved plaquette (FIG. 2). This artifact is 32 × 21 × 10 mm in size and is made from a piece of local soft, calcareous limestone. It was discovered during the 2009 excavation season, retrieved from the heavy fraction during flotation, and comes from a deposit interpreted as a compact, trampled, earthen surface that contains *in situ* lithic and faunal material. Two pieces of the plaquette were recovered and refit together. This modern break bisects the plaquette and occurred during excavation. When refitted, it is clear that the plaquette was also broken in antiquity, on both sides and the bottom, leaving only one edge intact. This intact edge has been ground or beveled to a flat surface.

The incisions on the plaquette reveal an intricate pattern of lines carved onto both the front and back face of the stone (the intact edge is oriented ‘up’ and the face with more prominent incisions is labeled as the ‘front’). Two different ‘motifs’ are identified: a primary motif of ladders and a secondary motif of individual lines (both thick and thin). On the ‘front’ are three ‘ladder’ patterns. Two of the ‘ladders’ share a ‘center rail’ between the sets of rungs, and the rungs are off-set from each other. The rungs do not articulate with the outside ‘rails’ on either ladder. The third ladder is wider than the others and is separated from the first two. Between the sets of ladders is a single parallel line. Several thin lines intersect this primary motif on the front. Running horizontally across the top of



2. The incised plaquette (front and back) from al-Kharrānah IV. Lower image shows a schematic of the plaquette with the locations of Ladders 1–4.

the plaquette is a deeply incised groove, creating a 'rim' along the top. The back face has another 'ladder' running parallel to the top of the plaquette. The rungs towards one end are closely spaced, and they gradually widen. This ladder is made with shallow, thin incisions. Two thicker incisions run just below the 'ladder' creating the bottom rail. A long, thin incision runs parallel to the ladder on the back face, and below this are a series of very fine, thin lines, which might be the result of grinding the plaquette's surfaces. There is no other evidence of grinding on the front or back face of the plaquette, however the traces could be obscured by the incisions or have been very fine and

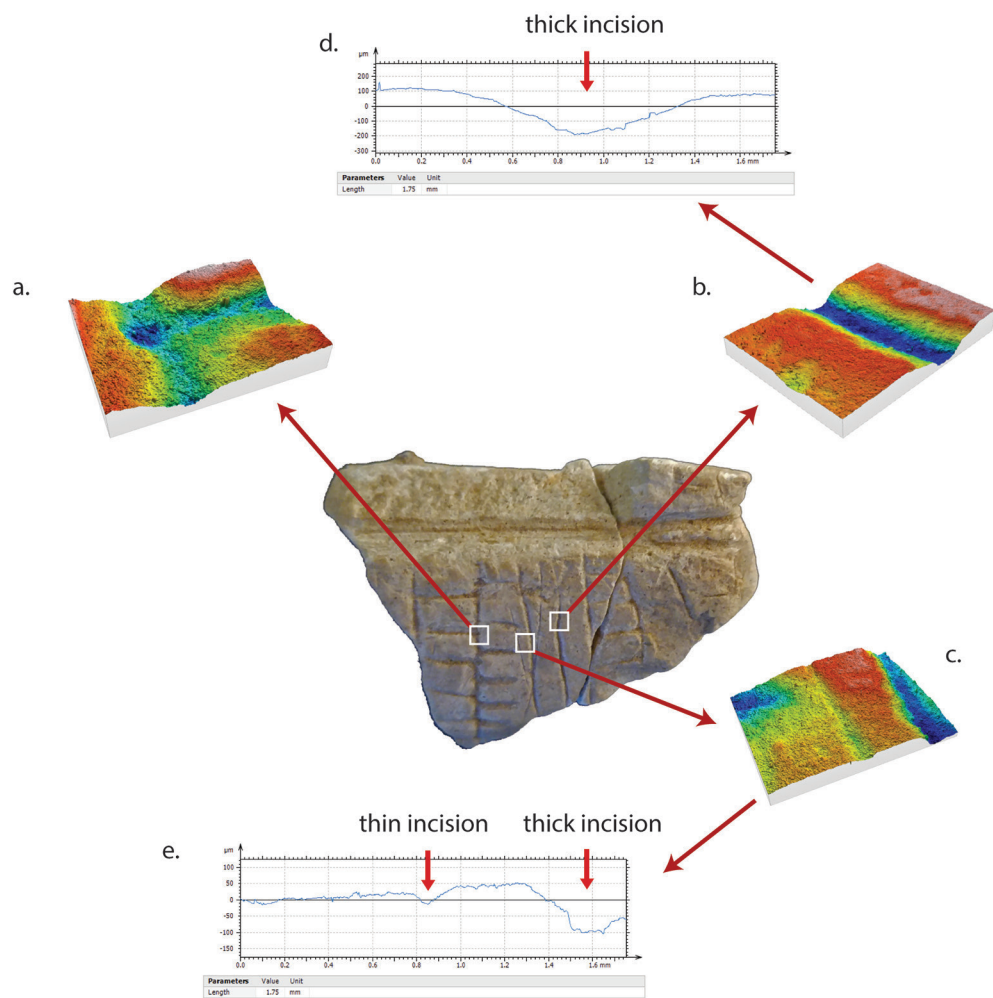
obliterated by post-depositional processes.

The plaquette was analyzed microscopically to better understand how the object was manufactured, including in what order the various modifications were made. First it was assessed with stereomicroscopy to document and optically identify different features. Next, individual components of these features were selected for further, high-resolution analysis. Surfaces and incisions were imaged and measured with a Sensofar Imaging Confocal Microscope using the 10× objective. These microscopes are used in precision engineering and surface metrology to measure small-scale surface topographies at the scale of nanometers.

The images were collected using blue light, which is at the shorter end of the light spectrum, minimizing chromatic aberration and producing higher resolution images than those collected from the complete white-light spectrum. The microscope produces a three-dimensional (3D) image of the surface, calibrated to ISO standards for the measurement of surface texture.

Analyzing the entire surface of the plaquette with high-resolution confocal microscopy is too time-consuming and

impractical, thus, the plaquette's features were sampled for detailed examination. In total, 16 different areas were sampled to collect 3D models of the incision cuts. This study presents the analysis of a preliminary sample of the incisions and more analysis is ongoing. Each sampled region results in a 3D topographic 'map' of the surface. These images allow for detailed visual identification of the incisions. In addition to the optical powers of the three-dimensional models, profile paths can be extracted to analyze the



3. Front of the incised plaquette with 3D confocal images of incisions: a) two intersecting 'thick' incisions at the center rail of ladders 1 and 2, b) thick incision, c) thin incision and a thick incision, d) profile of thick incision, e) profile of thin and thick incision.

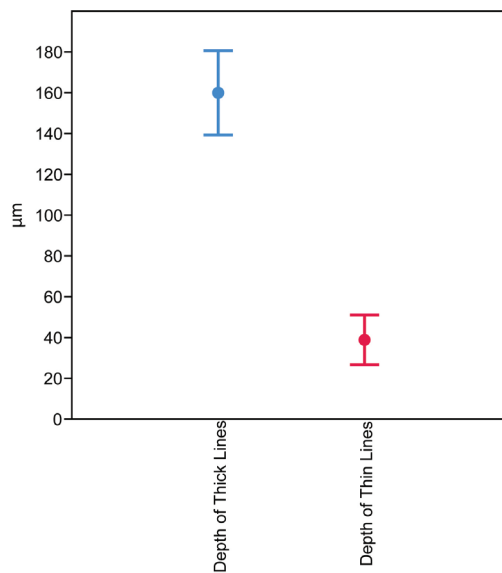
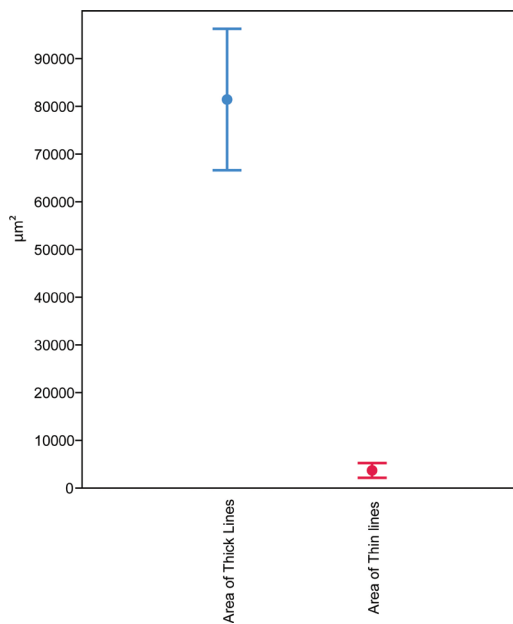
shape and depth of the incision. Of these areas, several of the incisions that were visually classified as ‘thick’ were sampled, as were several that were classified as ‘thin’ using stereomicroscopy. Incisions on the front and back face were also sampled.

The thick incisions are wide and deep, with a rounded v-shape to the cut. In contrast to the thick incisions, the thin incisions are much shallower and narrower (FIG. 3). The 3D images and extracted profiles in Figure 3 show the difference in these incisions, with the ‘thin’ incisions being much shallower, narrower, and with a sharper v-shaped cross section.

A profile, or cross-section, was extracted from each of the 16 scanned areas to better understand the relationship between the thick and thin lines. The profiles were extracted from the area with the highest point in the microtopography to consistently

sample the surfaces. From these extracted profiles, the ‘area of the hole’, or the area of the cut, was calculated. The area was calculated under the peak lines, representing the top of the cut. A comparison of the means of the incision area using a t-test shows a strong statistically significant difference between the means of the thick and thin incision samples ($p= 0.027$; FIG. 4). Likewise, the depth of the thick and thin incisions were compared (FIG. 5). The difference in the means between these two samples were also shown to be statistically significant, with the thick incisions significantly deeper than the thin ones ($p= 0.016$).

Through a detailed microscopic analysis of the plaquette, several manufacturing features were elucidated. First, there are two different groups of incisions, thick and thin, that are found on both faces of the plaquette. These lines have different average areas



4. Whisker plot showing the difference in means between the area of the thick lines and the area of the thin lines.

5. Whisker plot showing the different in means between the depth of the thick lines and the depth of the thin lines.

and different average depths. In addition, the thin incisions tend to have a more v-shaped profile. This suggests that either the incisions were made with two different tools, potentially at different times, or there was a different reason why these incisions were made. For example, were the thinner incisions meant to have less permanence? The ‘ladders’ on the front are all made with ‘thick’ incisions, making them highly visible. A few of the thin incisions on the front face cross over the thick ones, suggesting that the thicker incisions were made first, followed by the thinner cuts. In contrast, the ladder on the back is primarily made from thin incisions, except the lower rail. The thin incisions on this ladder might represent a ‘sketch’ before the ladder was deeply etched. Or perhaps this ladder was meant to fade away with time or be less visible than the other ladders on the plaquette?

The deepest incised lines on the plaquette run horizontal across the top of the object creating a ‘rim’ around the top. The line appears to be incised several times in the same place, creating the deep groove and the extracted profile shows that the bottom of the cut has several different incisions. This suggests that this line was made with numerous gestures, enforcing the placement and permanence of the incision.

Some information can also be gained about the order of incisions, or the sequence of actions taken to make the patterns on the plaquette. On the front face the three rails of ladders 1 and 2 were first incised. The rungs all intersect with the center rail; however, only the top rung on the left side of the ladder intersects with the outer rail. None of the rungs on the right side of the ladder intersect with the outside rail. This suggests that the center rail was drawn first, then the left rail. The right rail might have been drawn next, or potentially the rungs drawn, followed by the rail which is thinner and less permanent than the other rails. There are two small lines above one of the rungs,

suggesting that the artist was thinking about a different placement before settling on the current position. In contrast, all of the rungs on ladder 3 on the front face intersect with both rails. Thus, the rails may have been drawn first to act as a guide for the rungs. A single line is positioned between the two ladders, suggesting it was drawn afterwards. Two thin lines cross-cut ladder 2, indicating that they were drawn last. Although very faint, the rungs on ladder 4 (on the back face), mostly intersect with the two rails. This suggests that the rails were drawn first, followed by the rungs in between.

Discussion and Conclusions:

al-Kharrānah IV Art in Context

Bringing the al-Kharrānah IV plaquette back into context with other Levantine Epipalaeolithic art illuminates some interesting patterns. Despite the fact there have been very few pieces of art found in pre-Natufian Epipalaeolithic contexts, the ladder motif is represented at several sites. For example, engraved objects with ladder motifs have been found at Urkan e-Rub, ‘Ayn al-Kassīs (Ein Qashish), and Wādī al-Maqdamah (see above). Adding the al-Kharrānah IV plaquette to this Epipalaeolithic artistic corpus shows repeating patterns of ladders in Pre-Natufian art. Across the Levant, incised ladders represent more than half of the artistic patterns from this period (Hovers 1990; Byrd 2013; Yaroshevich *et al.* 2016). To date, there have only been two pieces of pre-Natufian art found in Jordan, the plaquette at al-Kharrānah IV and the incised stone at Wādī al-Maqdamah. The incised plaquette is the only piece from an *in situ* context, representing the earliest known ‘art’ object from a secured context in Jordan.

In European Palaeolithic art, ladders have been interpreted as notational schemes, external memory systems containing encoded information (e.g., Marshack 1991; d’Errico *et al.* 1994). Recently, arguments have been made that the ladder plaquette

from ‘Ayn al-Kassīs (Ein Qashish) represents a device for recording hunter-gatherer aggregation events or the availability of resources (Yaroshevich *et al.* 2016). Each rung might represent a new aggregation meeting, or the seasonal cycle of gazelle hunting. Is the al-Kharrānah IV ‘ladder’ plaquette a similar device? If indeed the thick and thin incisions were made with different tools, then the al-Kharrānah IV plaquette can be placed in a temporal framework where the incisions might have been made at different times, recording different events or similar events at different times.

It is unknown whether we will ever be able to understand the symbolic ‘meaning’ of the ladder motif on the Pre-Natufian Epipalaeolithic plaquettes, or whether these meanings are even knowable. Despite these unknowns, the repeating pattern of ladders found on plaquettes from the Jordan Valley all the way to the al-Azraq Basin indicates participation within a wide regional interaction sphere of information exchange. As well, this motif suggests that there is temporal cultural continuity, as the ‘ladder’ motif is passed through generations. Symbolic motifs shared regionally and temporally suggest cultural interaction and perhaps a shared sense of cultural affiliation between different communities across the Levant. As an aggregation site, al-Kharrānah IV is uniquely situated as a place on the landscape for inter-community interaction and information exchange, where symbolic meanings are transmitted, and important moments are recorded in stone.

Acknowledgements

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