Life, death, and the destruction of architecture: Hunter-gatherer mortuary behaviors in prehistoric Jordan

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ABSTRACT

The end of the Pleistocene in Southwest Asia is widely known for the emergence of socially-complex hunter-gatherers—the Natufians—characterized by a rich material culture record, including elaborate burials. In comparison, human interments that predate the Natufian are rare. The discovery and excavation of a hut structure at the 20,000-year-old Epipalaeolithic site of Kharaneh IV in eastern Jordan reveals the remains of an adult female intentionally placed in a semi-flexed position on one of the structure's floors. The structure was burned down shortly after her deposition, extensively charring the human remains. The burying of the dead within structures and the burning of domestic structures are well-known from later Neolithic periods, although their combination as a mortuary practice is rare. However, for the Early Epipalaeolithic, the burning of a structure containing the primary deposition of human remains is novel and signifies an early appearance for the intentional burning of bodies as a mortuary treatment and symbolic behaviors associated with the interrelated life histories of structures and people.

1. Introduction

The treatment of the dead body provides valuable insight into the spiritual worldviews of past societies; namely, how the living experienced the process of death and how the dead continued to shape social transactions related to memory and place. Archaeological and ethnographic examples highlight the importance of funerary rites for the living to maintain connections with the dead, honor ancestors, and establish and maintain connections to particular places (Bell, 1997; Croucher, 2012; Gillespie, 2001; Gowland and Knüsel, 2006; Littleton and Allen, 2007; Pearson, 1999). In Southwest Asia, the significance of these rites in prehistory is well-documented by a rich record of burials within habitation sites and at specialized funerary sites or cemeteries. We witness a tradition of elaborate and performative burial practices in the Late Epipalaeolithic, or Natufian (c. 14.5–11.5 cal BP) (Grosman and Munro, 2016; Grosman et al., 2008; Munro and Grosman, 2010), and Neolithic (c. 11.5–7.5 cal BP) (Croucher, 2012) periods. While these varied practices are foreshadowed at some Early and Middle Epipalaeolithic sites (c. 23–14.5 cal BP) (Maher et al., 2012b), evidence for these types of mortuary practices at these earlier sites remains elusive.

The Neolithic period of Southwest Asia has long been known as heralding the emergence of farming and agriculture; however, recent work has shown that many of the features associated with the 'Neolithization process' are now evidenced in preceding periods and this 'transitional' period is rather one of accelerating transformation (Hodder, 2018; Maher et al., 2012b; Watkins, 2017) where behavioral changes are not necessarily manifested archaeologically in a continuous or linear manner. Moreover, not only do the archaeological correlates of these changes appear on individual timelines and earlier than presupposed, but it is also clear that these transformations go beyond growing plants and raising animals—they are deeply social, technological, economic, and symbolic in nature. The findings reported here from Kharaneh IV thus contribute greatly to current discussions on the 'slow' (Hodder, 2018) developing of a Neolithic way of life (or even whether there is such a thing).

We now recognize that the 10,000 years prior to the Neolithic, known as the Epipalaeolithic period (23–11.5 ka cal BP) marks a number of social practices, such as sedentism, plant cultivation and animal management, seafaring, and elaborations in art, symbolism and architecture, each with their own timeline and trajectory, but that, if taken

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together, presage the complex, multi-faceted transition(*s*) from hunter-gatherer to settled, farming village life. While much of this data comes from the latest phases of the Epipalaeolithic—the Natufian—new work at Early and Middle Epipalaeolithic sites is illuminating an early appearance of these practices before they become entrenched as traditions. To-date, pre-Natufian Epipalaeolithic burials in Southwest Asia are known from seven sites, and number fewer than 20 individuals (Table 1), in comparison to the hundreds known from Natufian sites (Grosman, 2003); making any new finding a significant contribution to our growing body of knowledge on early mortuary behaviors and the transformative nature of these hunter-gatherer societies. They also highlight that many of these transformations occurred within fully hunting and gathering societies.

In 2015–2016, a hut structure was uncovered at the 20,000-year-old Early Epipalaeolithic aggregation site of Kharaneh IV in eastern Jordan, adding to the growing number of structures found at the site (Maher et al., 2012a). Excavation of the uppermost deposits of this brush hut revealed the primary deposition of the remains of an adult female individual in a semi-flexed position on the upper floor of the structure. In the later Natufian period in the Levant, it was common for burials to be associated with domestic spaces, including within stone-built living structures or houses. The primary deposition of human remains associated with wooden hut structures at Kharaneh IV demonstrates an earlier association of deliberate deposition of human remains within architecture at domestic spaces. However, the burning of the structure with the primary deposition of human remains inside is also novel, signifying that the events of the end of the life of the structure and the individual were interrelated. This type of mortuary treatment or practice is unknown from contemporary sites worldwide, and such direct associations between human burials and architecture do not become a regular burial practice in this region for at least another 5000 years when sedentism is more widely recognized to reinforce links between people and specific places. Bioarchaeological analysis of the skeletal remains and the context of the body shed new light on the lifeways of Epipalaeolithic people, as well as an emergent repertoire of mortuary practices documented at the onset of a phase of major social change during the transition from hunter-gatherer to farmer. The Kharaneh IV human remains may thus represent an early expression of both cremations as a bodily treatment for the dead and human burial within houses, a well-known practice from the Eurasian Neolithic.

2. Hunter-gatherers of Southwest Asia: Place-making in life and death

Archaeological evidence for the origins of village life in Southwest Asia suggests that by the onset of the Neolithic period, behaviors such as the establishment of sedentary villages, intensified plant use, a rich artistic repertoire, symbolic artifacts, long-distance networks of interaction, elaborate burial practices, and cemeteries were already well-established (Asouti, 2006; Asouti and Fuller, 2013; Bar-Yosef and Valla, 2013; Finlayson et al., 2011; Goring-Morris and Belfer-Cohen, 2010, 2011; Watkins, 2010; Watkins, 2015). Our understanding of the Epipalaeolithic is thus crucial for interpretations of the timing and circumstances for the emergence of cultural and social complexity (Maher et al., 2012b). The Epipalaeolithic is divided into three phases—Early, Middle, and Late—with the former two traditionally characterized by highly mobile hunter-gatherer lifeways, while the latter is typified by the Natufian culture with evidence for more sedentary villages of complex hunter-gatherers (Bar-Yosef, 1998; Belfer-Cohen and Bar-Yosef, 2000; Belfer-Cohen and Goring-Morris, 2011; Finlayson et al., 2011; Goring-Morris and Belfer-Cohen, 2010, 2011; Maher et al., 2012b).

Of the many archaeological correlates presumed to mark complexity among Late Pleistocene hunter-gatherers, elaborate burial practices and cemeteries feature prominently as evidence for the types of cognitive shifts presaging a Neolithic worldview (Hodder, 2020), such as at the Natufian funerary site of Hilazon Tachtit, where performative rituals

Table 1

Pre-Natufian Epipalaeolithic burials from the Southern Levant. Early and Middle Epipalaeolithic burials from the Southern Levant, noting burial context, body position and any associated grave goods.

Site	Time period & cultural affiliation	Description
Ein Gev I	Early EP (Kebaran)	Almost complete primary burial of adult female in shallow pit, possibly under structure floor; tightly flexed, heavily damaged; no associated grave goods reported; gracile skeleton (Arensberg and Bar Yosef, 1973)
Ohalo II	Early EP (Terminal UP/Early Kebaran)	Complete primary burial of adult male 35–40 yrs old in shallow pit in space adjacent to three structures; semi-flexed with hands folded over torso and legs folded behind; head elevated on three stones; hammerstone between legs; incised bone fragment behind head; robust skeleton
		Isolated remains of another adult and child nearby (Nadel, 1994a; Nadel, 1995)
Ayn Qassiya	Early EP (Nizzanian)	Almost complete primary burial of an adult male in shallow pit; tightly bound body with arms and legs folded into torso; no associated grave goods; robust skeleton (Richter et al., 2010)
Kharaneh IV	Early EP (Kebaran)	Complete primary burial of an adult male in a shallow pit, possibly under the floor of Structure 1; large stone placed over lower torso and pair of gazelle horn cores found over his head; severe osteoarthritis; robust skeleton
		Partial burial of adult male; unknown position or location; highly fragmented; severe osteoarthritis; robust skeleton
		Isolated human tibia found in pit associated with gazelle horn cores and mandibles
		Complete primary deposition of adult female wrapped and placed on Structure 2 floor prior to burning; semi-flexed position; no associated grave goods (Rolston, 1982)
Neve David	Middle EP (Geometric Kebaran)	Almost complete primary burial of adult male in shallow pit; flexed position; grave marked by several large stones; broken groundstone bowl behind head; milling stone between legs; stone slabs and breached mortar over the skull; missing ribs, vertebrae, teeth
		Highly fragmented partial burial of another adult (Bocquentin et al., 2011b; Kaufman, 1989; Kaufman and Ronen, 1987a)
Qadish Valley	Middle EP (Geometric Kebaran)	Partial primary burial (lower limbs and one foot) of adult, probably male, in well-defined pit; unknown position and rest remains unexcavated; two polished pebbles near patella; shell beads and trapeze/rectangles associated with limbs (Garrard and Yazbeck, 2003)
Wadi Mataha	Middle EP (Geometric Kebaran)	Complete primary burial of adult male with head trauma; buried face down with arms and legs flexed (and bound?) behind back; no clear burial pit; grave includes breached mortar and large non-local blade associated with skeleton; robust skeleton with marked asymmetry (Macdonald et al., 2016; Stock et al., 2005)
Uyyun al-Hammam	Middle EP (Geometric Kebaran)	Partial primary burial of adult, probably female; semi-flexed; articulated pelvis and lower limbs; mandible; associated with limestone pounder, flint tools (endscrapers, core, trapeze/rectangles), red ochre, *Bos* patella, worked horn core implement (dagger), and Red Fox skull

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Table 1 (*continued*)

Site	Time period & cultural affiliation	Description
		Partial primary burial of adult male; heavily disturbed and fragmented; associated with deer antler, flint blades and flakes, worked bone spoon, and Red Fox skeleton matching skull of above-mentioned grave; robust skeleton
		Partial secondary burial of adult; isolated bones (mandible, tibia, clavicle, ribs, scapula, humerus, radius, ulna) clustered in heavily disturbed pit
		Proximal femoral fragment of subadult; sex indeterminate; no clear burial pit
		Partial secondary burial of adolescent or young adult; sex indeterminate; long bones aligned on large flat stone slab with skull and disarticulated phalanges below slab; within stone-lined and stone-filled pit
		Complete primary burial of adult; sex indeterminate; extended with left arm over chest and right arm extended along right side; no discernable pit; trapeze/rectangle under right humeral head; unworked cobble directly over missing/crushed pelvis; two angular, unworked cobbles over face and at back of cranium
		Almost complete burial of adult male; no discernable pit; extended with right arm flexed over lower torso and head turned to left shoulder; two fragments of basalt groundstone vessel and flint endscraper over pelvis; distal phalange of medium-sized mammal around neck
		Partial secondary burial of adolescent or gracile adult; sex indeterminate; no discernible burial pit; part of cranium and long bones buried with long bones from medium-sized mammal (gazelle?)
		Complete primary burial of adult; extended or semi-flexed
		Complete burial of adult female in shallow pit; extended with head tilted forward and down; skeleton highly fragmented by post-depositional damage; hands and feet missing; several large rocks associated with skeleton (over head, below right femur, inclined alongside skull) (Maher, 2007; Maher et al., 2011)

mark the passage of special community members (Grosman and Munro, 2007; Grosman and Munro, 2016; Grosman et al., 2008), or cemetery/habitation sites like Ein Mallaha where the living and the dead overlap within domestic spaces (Bocquentin, 2007). Place-making, or persistent places known through signatures of repeated or prolonged occupation (Schlanger, 1992), have relevance to our understanding of how Epipalaeolithic hunter-gatherer worldviews shaped the Neolithization process (Maher, 2019, 2020). Indeed, the combination of burial rituals occurring *at* 'places' chosen for their particular ceremonial qualities, such as the acoustics of sites with bedrock mortars for Natufian funerary rites (Rosenberg and Nadel, 2014), seems to strongly link together the living, the dead, and specific places—both structures within sites and sites within the larger landscape—in the world of Epipalaeolithic hunter-gatherers. Furthermore, Epipalaeolithic places marked through a combination of repeated occupation and the burial of the dead, thus, provide one more hint that mortuary practices thought characteristic of the Neolithic were enacted by hunter-gatherers. For at least 20,000 years, and perhaps more, the placement of burials in domestic spaces and their subsequent special treatments (see below) were important aspects of the activities and performances of the living.

Placing the Epipalaeolithic burial record into context with evidence

for similar mortuary treatments elsewhere (in time and space) highlights the unusual treatment of the individual from Kharaneh IV. The earliest known example of the deliberate burning of human remains as a mortuary practice is the LM1 skeleton found at the site of Lake Mungo in the Willandra Lakes region of Australia. Although earlier analyses placed this burial at ca. 26kya (Bowler et al., 1972), and later 17kya (Gillespie, 1997, 1998), more recent dating of the skeleton places it closer to 40kya (Bowler et al., 2003; Olley et al., 2006). The first evidence for cremations outside of Australia occur much later in the archaeological record. Within Europe the earliest cremation may be the remains of Rochereil 1 in France (May, 1986: 121 in Orschiedt 2017). Although some of the occupations in the cave date to the Late Magdalenian, it has been suggested that this 'cremation' dates to the Mesolithic deposits as no other burned human remains have been recovered from Upper Palaeolithic sites (Orschiedt, 2018). This fits with archaeological patterns as the use of fire in mortuary practices increases during the Mesolithic, with cremations found throughout North-West Europe (Gray Jones, 2017). Moving to the Levant, the earliest evidence of burning human remains as a mortuary practice was thought to be during the Neolithic (Akkermans and Smits, 2008; Akkermans and Verhoeven, 1995b). In other regions, mortuary behavior including cremation of human remains is first expressed within the Holocene (Cerezo-Román et al., 2017). With the exception of the cremation at Lake Mungo, the burning of humans remains in mortuary contexts appears to be a Holocene phenomenon.

3. The archaeological site of Kharaneh IV

Within the broad cultural-chronological scheme of the Epipalaeolithic, the Early/Middle Epipalaeolithic site of Kharaneh IV in eastern Jordan was occupied between 19,800 and 18,600 years ago (Richter et al., 2013) and, in this 1200-year span, multi-season, prolonged and repeated habitation created one of the largest Epipalaeolithic/Paleolithic sites in the region (Fig. 1). The site contains some of the region's earliest evidence for hut structures, artifact caching, complex wetland plant and cereal use, and symbolic artifacts. The nature of these structures and associated caches, as well as their intentional destruction, suggest symbolic behaviors associated with dwelling and place-making at a scale significantly greater than we see for another 8,000 years (Maher and Conkey, 2019). The enormity of the site and an unusually high density of archaeological remains suggests that the site functioned as an aggregation locale; a focal point on the landscape where people congregated to participate in diverse economic, technological, social, and symbolic/ideological activities (Maher, 2016). Previous work at the site on the movement of material objects and technological knowledge to and from Kharaneh IV suggests these hunter-gatherer groups were involved in long-distance exchange networks enacted in an intensively used regional landscape (Maher and Macdonald, 2013; Maher et al., 2016; Richter et al., 2011).

Kharaneh IV is located in the Azraq Basin, an extensive drainage basin in eastern Jordan extending from the foothills of the Jebel Druze to the north to the northern extent of the Wadi Sirhan depression in Saudi Arabia. Ongoing palaeoenvironmental reconstructions throughout the basin demonstrate a series of varied and dynamic micro-environments over the last 300,000 years that served as attractive locales for human settlement throughout prehistory (Ames et al., 2014; Betts, 1998; Copeland and Hours, 1989; Cordova et al., 2013; Garrard and Byrd, 2013; Maher et al., 2016). At Kharaneh IV, extensive wetlands and grasslands supported a wide diversity of flora and fauna concurrent with the repeated, prolonged and multi-season occupation of the site (Henton et al., 2017; Jones, 2012; Jones et al., 2016a; Jones et al., 2016b; Maher, 2016, 2017; Ramsey et al., 2018; Ramsey et al., 2016). Originally investigated in the 1980′s (Muheisen, 1983, 1988a, b; Muheisen, 1988c; Muheisen and Wada, 1995), excavations at the site were renewed in 2008 as part of the Epipalaeolithic Foragers in Azraq Project (EFAP) and we have completed eight excavation seasons (2008–2010, 2013, 2015–2016, 2018–2019) and one study season (2011). Recent work at
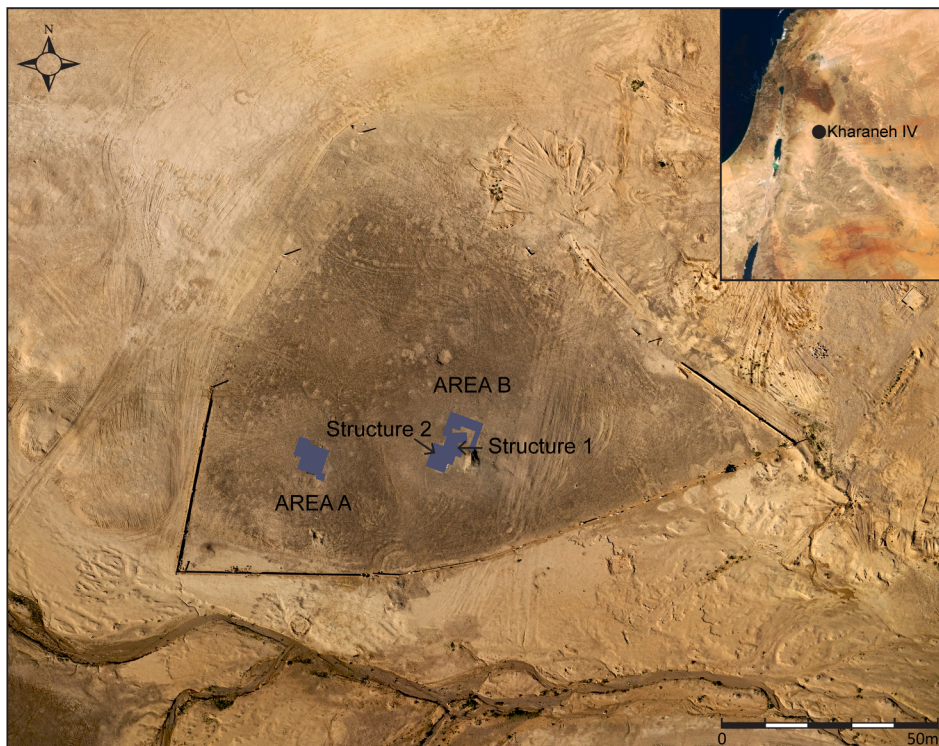
Fig. 1. Aerial photograph of the Epipalaeolithic site of Kharaneh IV. This overview of the site documents the extent of the site shown as the darkened chipped stone pavement on its surface. The Wadi Kharaneh is visible in the foreground, to the south of the site, and contemporary military berms are visible to the east and north. The location of Kharaneh IV within the southern Levant is shown inset. The extent of excavations areas A and B are shown by the highlighted areas, and arrows point to the locations of Structures 1 and 2 discussed in the text. (Photo courtesy of the Fragmented Heritage Project).

Kharaneh IV reveals that: (a) within the excavated area of the site, there are four, and probably more hut structures in the Early Epipalaeolithic phases; (b) the Early Epipalaeolithic structures display a complicated sequence of use, re-use and post-depositional events; (c) each structure provides a high-resolution record of activities performed during the use and destruction of these features, (d) each of these hut features is associated with 'inside' and 'outside' activities, and finally (e), at least three of these structures were intentionally burned at the end of their use-life, indicating the life histories of these features were imbued with multi-layered mundane and symbolic meanings (Maher et al., 2012a) (Figs. 2 and 3). Here we focus on the Early Epipalaeolithic use of space related to one of these excavated structures—Structure 2—which contains the primary deposition of human remains clearly associated with the use and destruction of the structure itself.

While hut structures and human burials are known from other Early Epipalaeolithic sites, such as Ohalo II (Nadel, 1994b, 2003b) and Ein Gev I (Arensburg and Bar-Yosef, 1973), this is the first time that human remains have been found in clear association within structures in pre-Natufian contexts. The excavated hut structures at Ohalo II demonstrate a complex suite of activities surrounding their construction and use, including specific structured domestic activities performed within the structures (Nadel, 2002, 2006). However, the well-marked human grave is found outside, but in close proximity, rather than within the structures. At Ein Gev I, an adult female is reported as associated with a stone pavement interpreted as a possible floor; however, it is unclear whether this individual was buried below an existing structure, or the stone pavement was constructed, and its builders were unaware of previous use of the area. A lack of evidence for disturbance of the stone pavement, or a clear burial pit connected to it, suggests that an interpretation of intentional burial beneath an existing structure is tentative. Although dating to the later Middle Epipaleolithic period, at Neve David an adult male was buried below, but in unclear association with, a stone arrangement (Bocquentin et al., 2011a; Kaufman and Ronen, 1987b). Thus, the findings within Structure 2 at Kharaneh IV are the earliest evidence here for a clear, intentional primary deposition of human remains *inside* of a dwelling or structure and associated with its use and

destruction.

4. Excavation of the Kharaneh IV structures

Continuing excavations at Kharaneh IV have revealed evidence for at least four hut structures during the Early Epipalaeolithic occupations (Figs. 2 and 3). The site is divided into a 1 × 1 m grid and Structure 2 was further sub-divided into 25 × 25 cm squares to maintain horizontal control. Following standard Paleolithic excavation strategies, deposits were excavated in stratigraphic levels and artifacts on the surface of deposits were piece plotted. All sediment excavated from the site is collected for flotation and artifacts not recovered during excavation are sorted from the resulting heavy fraction.

Structure 1 is just over 2 m × 3 m in size and shows a complex sequence of construction, maintenance, use, and destruction events, where the hut was burnt after abandonment (Maher et al., 2012a) (Fig. 3). Like the structures documented at Ohalo II (Nadel, 1994a; Nadel, 2003a), the structure base is a bean-shaped basin dug into pre-existing artifact-rich deposits, with the construction of three distinct compact and comparatively 'clean' floors containing *in situ* artifacts. Each floor reveals discrete concentrations of artifacts (i.e., cores or scrapers or fire-cracked rock) intentionally placed, or left, on their surface before leveling and laying a new floor (Macdonald and Maher, 2020). Phytolith analysis of the superstructure sediments from Structure 1 suggest that the occupants used wetland resources to construct the structure, including woody and shrubby dicots for the frame, and a variety of grasses, wetland reeds, and sedges as thatching (Ramsey et al., 2018). Some of the floors may have also been partially covered in matting. After use of the structure, it was burned down and on these burnt deposits, near the center of the structure, we found three distinct caches of pierced marine shells, containing several hundred shells brought to the site from both the Mediterranean and Red Seas, and each accompanied by a large chunk of red ochre (Figs. 2 and 3). The burnt structure was then sealed by a distinctive orange sand, suggesting it was intentionally destroyed after abandonment. Radiocarbon dates from Structure 1 place its use and destruction at ~ 19,400 cal BP (Maher
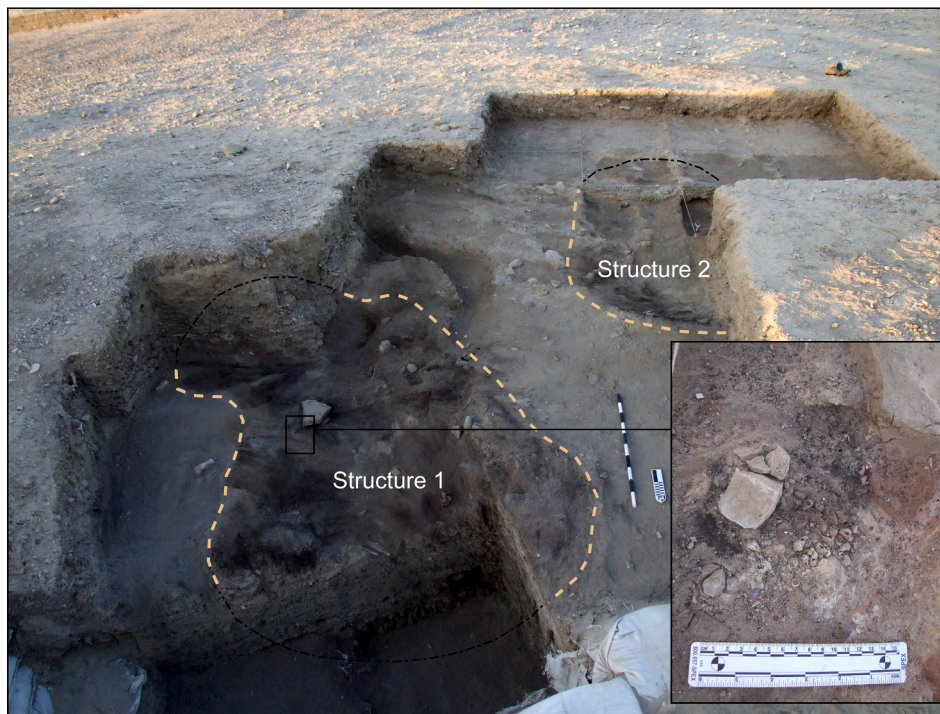
Fig. 2. Oblique plan view of Structures 1 and 2. Photograph of Structure 1 just prior to its excavation, showing the extent of the burnt and mottled superstructure sediments overlying the hut structure floors and associated deposits. Structure 2 is visible in the background, only partially exposed, but not yet excavated. Inset is one of the three caches of marine shells and red ochre found on top of the burnt layer. These were placed beside a large flat stone visible in top right corner of the inset photo. (Photos from EFAP Archive). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

et al., 2012a).

Structure 2 at Kharaneh IV was excavated during the 2015, 2016, and 2018 field seasons. The same pattern of construction, use, re-use and destruction evident at both Structures 1 and 2 indicates highly structured use of space and organization of activities here. Structure 2, located ~ 1.5 m to the southwest of Structure 1, is approximately 2.5 × 1.5 m in size (Fig. 3). Similar to Structure 1 (Maher et al., 2012a), this structure contained two very compact earthen floors, each covered in large artifacts differing in kind and abundance from 'outside' deposits and with a thin fill-like layer in between. Several radiocarbon samples from the floors and context containing the human remains of Structure 2 were submitted to Kech Carbon Cycle AMS Laboratory at Irvine and returned dates of ~ 19,200 cal BP (Table 2). These dates overlap with those from Structure 1 (Maher et al., 2012a). Structure 2 was also capped by a distinctive, largely sterile, orange sand. Below the capping of sand was a very loose, sandy and heavily burnt, dark brown to black layer. This layer is organic-rich, dense in highly fragmented charcoal and comparison with Structure 1 suggests it represents the burnt superstructure of the feature (Maher et al., 2012a). A primary deposition of an adult human female, found and excavated in 2016, sits at the boundary between the underlying floor deposits and overlying burnt superstructure (Fig. 4). The human bones were piece plotted, drawn in-field, and removed for further analysis.

5. The woman in Structure 2

The remains described here represent the fourth set of human remains from Kharaneh IV. Some of the body was embedded within the uppermost few centimetres of the occupation surface, likely as a result of trampling and settling with subsequent use of the site once the hut remains were sealed. This is particularly the case for the pelvis and lower limbs, which are also the lowest portions of the skeleton in elevation, located towards the centre of the shallow basin-shaped structure. The skull also seems to rest embedded within the compact floor deposits. The post-crania are semi-flexed and oriented south, while the skull is oriented facing east with the face tucked towards the left shoulder (Fig. 4). The skull is thus embedded into the floor at its maximum dimension and is higher than the rest of the skeleton.

The skeleton is partial and fragmentary, but what is present is relatively well preserved. An inventory of preserved skeletal elements is presented in Fig. 5. The skull was highly fragmentary, removed *en bloc,* and excavated in the laboratory. In general, the bone that is present is in good condition. The bones show evidence of pervasive thermal alteration in response to exposure to relatively low heat, particularly around the skull, clavicles and the anterior side of the humeri (Figs. 6 and 7). Here, bones are blackened throughout, with no evidence of white or calicined bone, or thumbnail fractures that would be expected of direct exposure to high heat, but of short duration. The pattern of charring is consistent with exposure to relatively low heat and rapid burning, consistent with a controlled brushfire (David, 1990; Ubelaker, 2009). Similar thermal alteration has also been documented in relatively fresh cadavers experimentally interred at depths of ~ 5 cm, where moderate heat exposure may lead to changes in coloration of bone (Bennett, 1999). The human remains are burnt in a manner and degree similar to the surrounding sediment, suggesting that this individual was placed inside the hut immediately prior to burning the structure (Figs. 4 and 5). The upper portion of the body, except the skull, showed a very thin (mm-thick) veneer of the organic-rich black layer below the bones (Figs. 6 and 7). The bone coloration is consistent to exposure to heat when fleshed and/or buried slightly below the surface of the heat (Fig. 7). Given the lack of a clear burial pit or sediment covering the body, it seems likely that this individual was placed on the floor and covered or wrapped in a hide, and perhaps also covered with a few centimetres of sediment, before the structure was burned. Thus, a wrapping or covering over the body may have buffered the skeleton from the effects of the heat, preventing cremation. The charcoal-rich layer thought to represent the burnt superstructure is 3–5 cm in maximum thickness above the post-crania, and 2–3 cm in thickness over the skull, suggesting that if the body was 'buried', the sediment formed a minimal covering. Alternately, the decomposition/burning of soft tissue may have left a residual layer of burnt material below this part of the body. Of note, the skeleton shows variable exposure to heat that is most pronounced on the skull and the anterior side of the torso and limbs (Fig. 7).

The confines of the fire were limited to the boundaries of the hut structure as the blackened, charcoal- and ash-rich sediment (and capping orange sand) is circumscribed and ends abruptly at the edges of
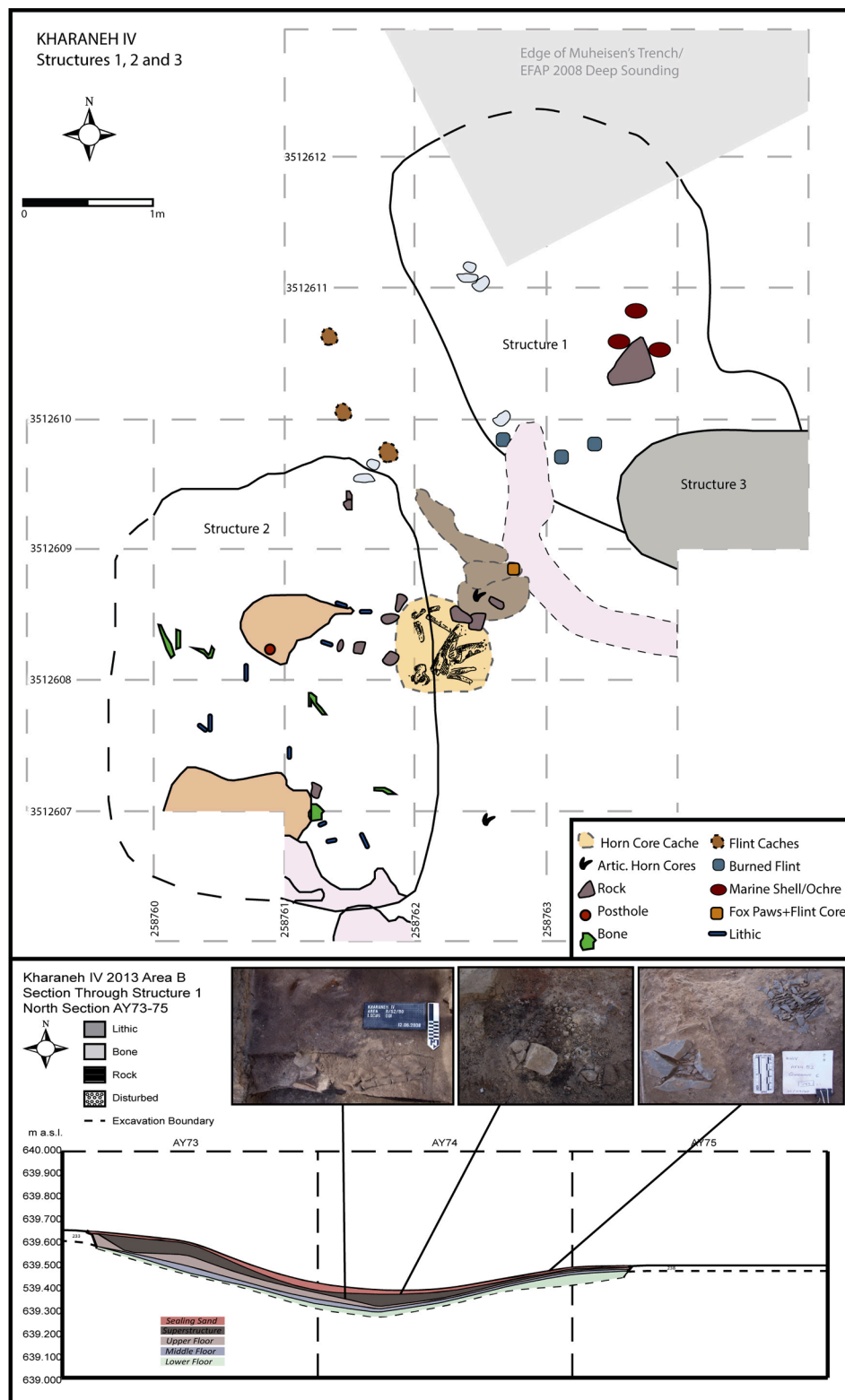
the structure, such that there is a clear boundary between the burnt interior and unburnt exterior (thus suggesting it was not an accidental fire in this area). Given that the skeleton shows extensive charring on the anterior side but no calcination, distortion or heat fracturing associated with many cremations, we suggest that it was deposited on top of the floor (perhaps covered with sand, matting, or wrapped in an organic covering such as a hide) and thus experienced only localized exposure to high temperatures. The quick-burning vegetal superstructure may not have reached temperatures high enough, or burned long enough, to completely cremate the individual inside. Both Structure 1 and Structure 2 document burning of the superstructure after use, suggesting a clear practice of burning to mark the end of the life of the structure and, in Structure 2, also that of the individual placed inside, perhaps as a way to clean and dispose of the body and the structure.

Table 2
Radiocarbon dates from Structure 2. Radiocarbon samples from four contexts within Structure 2, including one from the burial context, were analyzed by the Kech Carbon Cycle AMS Lab at the University of California, Irvine. These dates provide a relatively tightly clustered age range for the building, use and destruction of Structure 2.

| Context	Locus	Sample ID	Description	UCIAMS Lab No.	D^{14}C (‰)	^{14}C Age (BP)	^{14}C Date (cal BP)
AW70.45	314	543,239	Charcoal from Structure 2 burial, on skull	209,036	−860.9 ± 1.2	15850 ± 70	19050 ± 220
AW72.41	337	542,856	Charcoal from Structure 2 upper floor	209,037	−865.6 ± 0.6	16120 ± 40	19234 ± 232
AW72.36	326	543,404	Charcoal from Structure 2 middle floor (?)	209,038	−863.5 ± 0.6	15995 ± 40	19142 ± 214
AW70.55	324	549,505	Charcoal from Structure 2 fill assoc. with burial	209,039	863.7 ± 0.6	16010 ± 40	19158 ± 216
AV72.33	332	543,667	Charcoal from Structure 2 upper floor	209,040	863.1 ± 0.6	15975 ± 40	19129 ± 213
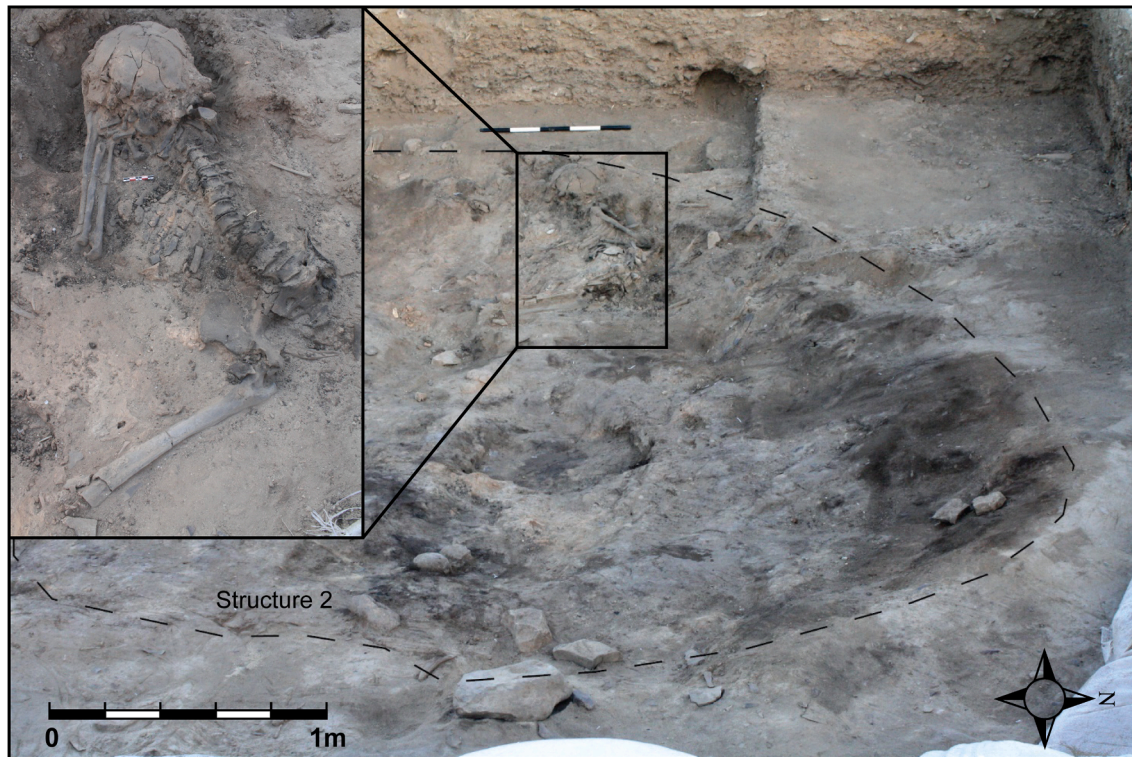
Fig. 4. Structure 2 during excavation. Photograph of Structure 2 upon excavation of the capping orange sand and exposing the mottled, burnt superstructure. Inset is a close-up of the semi-flexed human skeleton along the western wall of the structure, oriented east–west. While the post-crania are facing south, the skull is turned eastwards. Note the extent of burning, particularly visible along the vertebral column and pelvis. (Photos from EFAP Archive). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

The skeleton has been assessed as female on the basis of relatively small and gracile skeletal dimensions and a fragmentary partial greater sciatic notch that shows a relatively broad curvature (minimally category 4), a feature visible from the excavation photos (Fig. 6). The individual has relatively high levels of tooth wear, and most joints show evidence of osteoarthritis and mild to moderate lipping (Fig. 7). The first metatarsal has distal end lipping and eburnation, representing quite advanced deterioration of the cartilage. We estimate that this individual is an 'older adult', likely over the age of 50. Linear measurements of the post-crania are all consistent with a fully adult skeleton of very small body size. An estimation of stature using Feldesman and Fountain's (Feldesman and Fountain, 1996) generic stature equation would give a value of 147 cm. An alternative method, using Trotter and Gleser's (Trotter and Gleser, 1958) humerus regression equation, provides a stature estimate of 153 cm. With the condition and representation of skeletal elements, we place her stature between ca. 150–155 cm (or 4′11″-5′1″ in height); a very short individual by modern standards. Body mass, as estimated by Ruff's (Ruff et al., 1997) female regression equation (3), is 51.6 kg or ~ 114 lbs.

The remains excavated from Structure 2 represent the fourth individual found at Kharaneh IV, all of which come from the Early Epipalaeolithic occupation phases. Two burials were reported by M. Muheisen from the Early Epipalaeolithic phases of occupation during his excavations at the site in 1981 (Muheisen, 1988a; Rolston, 1982). One burial is the relatively complete, primary interment of an adult male with severe osteoarthritis. This individual was buried in a shallow pit, with a large stone placed over his pelvis and lower limbs and a gazelle horn core placed over either side of his head (Rolston, 1982). Our reconstructions of its context, based on the remaining field records and publications of Muheisen (Muheisen, 1988c), place it underneath the lowermost floor of Structure 1. We cannot confirm whether this individual was buried some time prior to the construction of the hut, or whether the hut was intentionally located above the grave; however, it is clear that the floor was not disturbed in order to place the individual beneath it. The second burial reported by Muheisen and Rolston is a highly fragmented, partial burial of an adult male individual. Unfortunately, the location of these remains is unknown. In 2010, we recovered a single tibia from a pit in the Early Epipaleolithic area, accompanied by several gazelle mandibles, horn cores, and other fauna. This tibia might represent the remains of a highly disturbed secondary burial in a pit or the disposal of a partial skeleton.
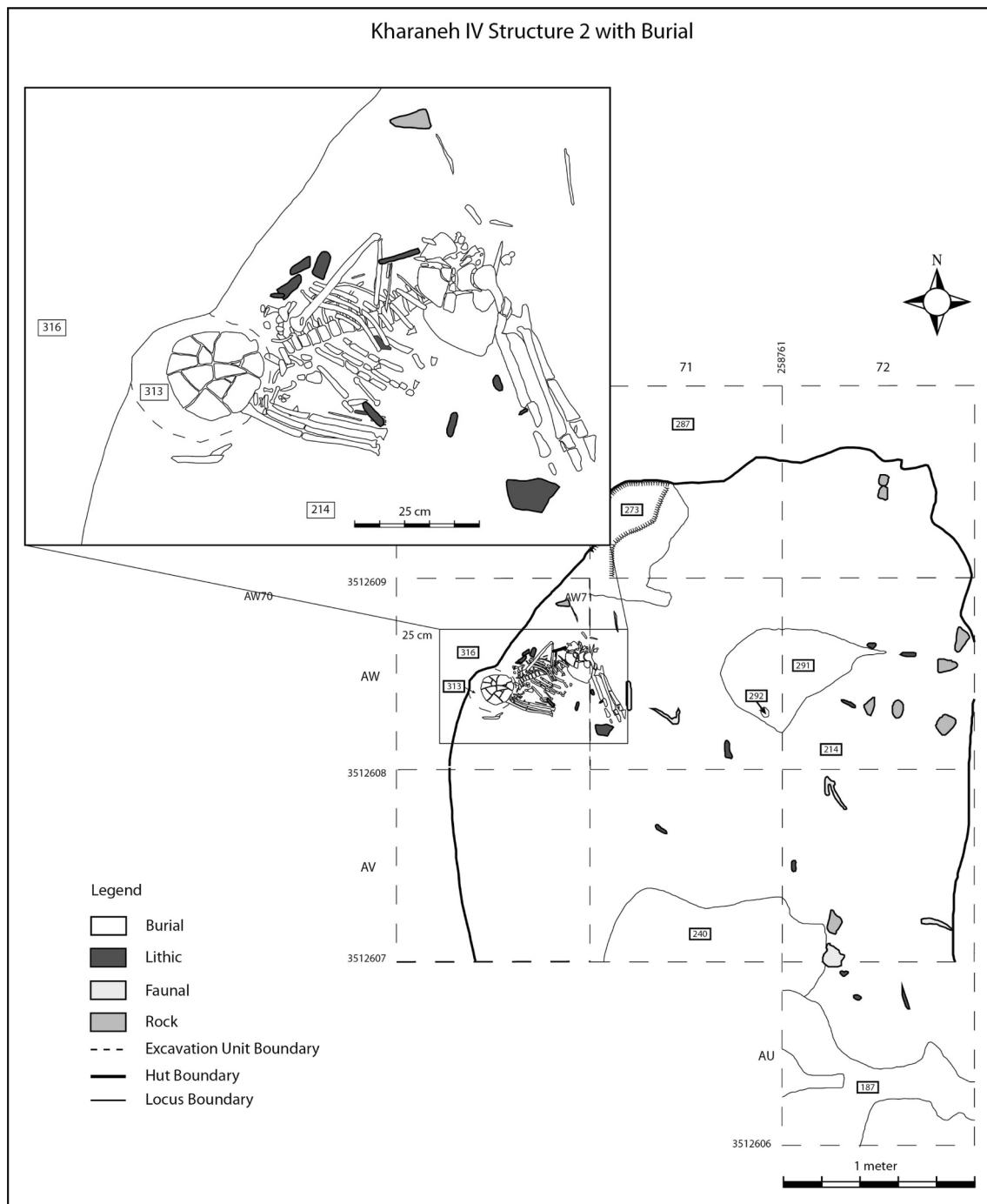
Fig. 5. Plan map of Structure 2. Detailed plan of Structure 2, showing the location and position of the human remains along the western wall of the structure.

6. Discussion

The human remains placed inside a structure that was subsequently burnt at Kharaneh IV reveal that links between people and places enacted through the permanent destruction of architecture are at least twenty thousand years old. The connecting of the dead—through the specific mortuary practices of burial and deliberate burning—to a specific place—a structure or house within Kharaneh IV—suggests an importance of marking a long-term link to the structure and the site, perhaps even as a sense of belonging, to the deceased, to the current occupants, or to create and maintain a persistent connection to specific people and houses over time. While the bodily treatment of burning exhibited at Kharaneh IV is not a cremation in the strict definition of the

term, it may be that the focus was not on the destruction of the body *per se*, but the destruction of the place[1] and the person in a way that connects them physically, and in memory. In this way, it may be interpreted as part of a continuum of fire related mortuary practices, and an example of the complexity and diversity of material expressions of the association of people and their structures, including as an early expression later

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[1] It is also possible that the destruction of the structure through fire was related to a desire to rid the space of vermin associated with the structure over time. This 'cleaning' is not necessarily at odds with the notion of 'cleansing' discussed below, but seems less likely as a sole explanation given the highly circumscribed burning patterns of each structure.
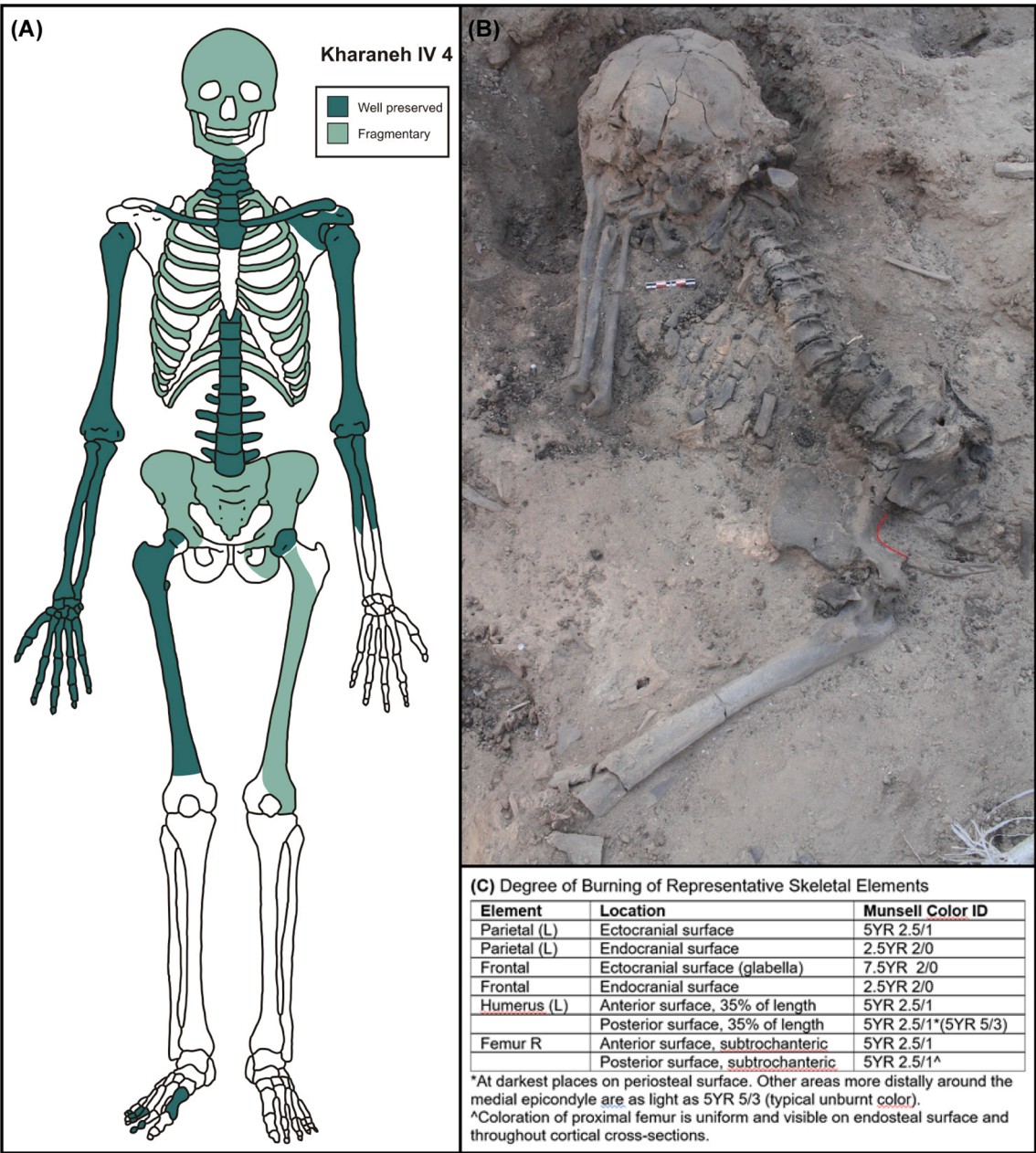
Fig. 6. Inventory and degree of preservation of burial. (A) Visual inventory of skeletal elements preserved. (B) Photograph of the skeleton showing her body position and overall degree of burning of the preserved skeletal elements. (C) Assessment of degree and color of burning of specific skeletal elements. (Photos from EFAP Archive).

cremation practices known throughout Eurasia. Through the practice of placing the dead in constructed spaces within settlements 20,000 years ago, we explore connections to 'place' made through the living and the dead.

With the primary deposition inside Structure 2 at Kharaneh IV, we suggest evidence for a symbolic aspect to Early Epipalaeolithic structures pre-dating the well-known association of burials and houses in the later Natufian and Neolithic (Bar-Yosef, 1998; Bar-Yosef and Valla, 2013). Recent discussions of Neolithic domestic practices highlight 'the animate house', where the structuring of daily activities within houses and the houses themselves takes on symbolic significance, and emphasize the construction of corporate (household) identities (Baird et al., 2017; Watkins, 2017). Evidence from Kharaneh IV suggests that we may be able to envision a similar cultural practice for Epipalaeolithic hunter-gatherers.

The discovery of human remains within Structure 2 at Kharaneh IV reveals an intertwined relationship between the inhabitants of the site and the built environment. The act of depositing an individual within the house and setting it ablaze intertwines the living, the dead, and architecture. Excavation of the structures and their contents provides a high-resolution reconstruction of these on-site activities. This allows a new perspective on how to interpret the use of space and the organization of activities at Epipalaeolithic hunter-gatherer sites by unraveling the social life of the site's occupants as traced through these architectural structures and the spaces between them. As well, this work extends our knowledge of the symbolism attached to dwelling spaces and repeatedly-used places in the Late Pleistocene landscape prior to the establishment of sedentary Natufian and Neolithic villages in the region. In this vein and discussed elsewhere, the hut structures, the site itself and the landscape around Kharaneh IV all relate to place-making, home-making and the creation of a social landscape (Maher and Conkey, 2019).

Fig. 7. Evidence of degree of burning of burial in Structure 2. (A) Close-up photograph of the upper vertebral column showing extensive burning of vertebrae and ribs, as well as lipping between individual vertebrae indicative of degenerative spinal changes. (B) Close-up photograph of the lower torso, with partial pelvis, showing the degree of burning of the remains. (C) Detail of the degree of burning evidence on the left humerus from posterior (left) and anterior (right) views. (D) Healed Smith's fracture on the distal right radius, with palmar (anterior) angulation of the distal epiphysis. Partial burning is also evidence on this skeletal element. (Photos from EFAP Archive).

As an aggregation site, Kharaneh IV was a significant place in the Epipalaeolithic social landscape where hunter-gatherer groups from the wider region came together repeatedly and for prolonged periods of time for a variety of economic, social, and ideological reasons. An examination of Structure 2 and the associated human remains allows us to explore the intertwined nature of dwelling and the life history of these structures at Kharaneh IV, providing an in-depth understanding of their construction, use, and destruction attained through analysis of the material culture and contexts associated with the structures, inside and out. In addition, it allows us to gain insights into the lives of its occupants. The presence of the human remains in Structure 2 suggests more than a functional connection between the architecture and inhabitants of Kharaneh IV. Rather the occupants constructed a sense of place by developing a link between the body and the built environment. Through this lens the structures at Kharaneh IV functioned as both domestic and symbolically-charged spaces, where the dichotomy between daily life and ritualized action is broken down (Hodder, 2011; Joyce and Gillespie, 2000).

During the Late Epipalaeolithic we see a change in mortuary behavior with burials within occupation sites and specialized cemeteries becoming more common features of the ritual landscape. Within occupation sites, human burials are commonly found in a variety of contexts, including within, below, and adjacent to houses (Bocquentin, 2007). However, the association between burials and stone structures at Natufian sites is quite complex as a result of regular re-use of occupation areas (and structures) for a variety of purposes, including interment of the dead. Highlighting the potential associations between the built environment and the dead within Mallaha, Boyd (Boyd, 1995) reminds us of the important role material culture, including architecture, plays in social reproduction and structuring rituals relating the living and the dead, particularly within and around houses. While Boyd is careful to point out that interpretations must be socially contingent, the growing evidence for associations between houses and human remains in the Natufian suggests we may see the beginnings of a shared mortuary practice. In addition, Natufian human interments are also concentrated in special-purpose mortuary sites, such as at Hayonim Cave, Raqefet Cave and Hilazon Tachtit. Some of these burials are associated with stone features; however, most of these structures are quite small and assumed to relate to some other (unknown) function and not habitation. Like the Early/Middle Epipalaeolithic burials (Table 1), there is diversity in the placement of the body and the inclusion of grave goods (Byrd and Monahan, 1995). Many of the burials have little-to-no artifacts in associated with them, while others have highly elaborate offerings including shell ornamentation, bone figurines, and flint tools (Belfer-Cohen, 1988; Belfer-Cohen, 1995). It is also clear that some individuals were buried within these funerary sites with highly formalized funerary rites and elaborate grave constructions (Grosman and Munro, 2016; Grosman et al., 2008). Although there is an increase in the frequency of burials during the Natufian (at least burials that are recovered by archaeologists), with more than 450 Natufian burials known to-date (Grosman, 2003), there is a continuation of practices witnessed in the Early/Middle Epipalaeolithic. The burial at Kharaneh IV in Structure 2 suggests an early clear connection between burials and houses and thus symbolic place-making in the Early Epipalaeolithic, a practice further

developed in the Natufian and elaborated on into the Neolithic.

With the onset of the Neolithic, the association between the dead and houses is apparent at many sites, with burial below house floors (with or without skull removal) becoming a normative burial practice. As with the Natufian cases, it is sometimes difficult to discern intentionality, as burial context and re-use of house foundations make establishing whether some burials relate to, pre-date or post-date the use of the house a challenge (Goring-Morris, 2005; Hemsley, 2008). However, even at early Neolithic sites like Wadi Faynan 16 in southern Jordan, there is a clear pattern of subfloor burial as a repeated practice, with one example of an individual placed below a floor but with their skull resting on a plaster 'pillow', such that the skull would have protruded above the floor level during occupation (Finlayson, 2010), making its incorporation into the house a prominent and clearly meaningful feature to its occupants.

Burials associated with both 'houses' and communal buildings, usually beneath floors, continue throughout the remainder of the Neolithic, showing this to be a cosmologically persistent and important burial practice (Watkins, 2006). However, there is also variation in mortuary context, with entire skeletons, headless skeletons, or only the skulls present inside a house. In other contexts, abandoned buildings were used specifically for burial of the dead, such as at Tell Qarassa North (Ibanez et al., 2010). Special burial structures, similar to those in Natufian funerary sites, are also noted from several later Neolithic sites. One such structure at Dja'de el-Mughara containing more than 38 individuals was labelled as a 'House of the Dead' (Coqueugniot, 1999). In the pre-pottery and, particularly, pottery Neolithic levels of Çatalhöyük, Turkey, there is abundant evidence of the intentional and unintentional linking of bodies and buildings. Here, there are examples both of bodies thrown into the fill of buildings, such as in the Building 160–162 sequence, as well as burials placed below plaster floors within buildings during occupation, such as in Building 17 (Haddow, 2016). However, neither appear burned and, with Building 160–162, it is not clear that these burials were 'intentional' in the same way as the Building 17 subfloor burials. Building 131 is an interesting comparison to Structure 2 at Kharaneh IV, however, as here it is clear that subfloor burials were the last events in this building's life history before it was burned (Haddow, 2016). A study of biological distance between individuals from the many subfloor burials from buildings throughout the Neolithic levels of Çatalhöyük suggest that individuals buried within houses were not necessarily biologically related to each other (Pilloud and Larsen, 2011). This indicates a clear connection between people and houses but where kinship had a significant non-biological component. The complex relationships between 'households' (however defined) and buildings at Çatalhöyük emphasizes that houses were ritual repositories as much as they were locales for traditional domestic activities (Düring, 2008; Hamilton, 2000); thus, we might think of houses (or huts) as focal points for groups of people, even lineages. They may not have been inhabited by families as we know them today; they may have been built, used, reallocated, and destroyed by lineages or non-related groups of people. Not all households are necessarily resident within one structure, and all those inhabiting a structure may not be part of the same economic unit (Hemsley, 2008). While Structure 2 at Kharaneh IV is of an obviously smaller scale than these Neolithic 'houses', it is worth remembering that this pattern of multilayered meaning in constructed space, intertwining ritual and domestic spheres with households of people, has a deep history in the Near East.

Another parallel to the primary deposition of human remains in Structure 2 at Kharaneh IV comes from the early Neolithic site of Jerf al-Ahmar. Here a primary burial of a 15-year-old female, missing her skull (another common Neolithic burial practice) and with her arms and legs splayed, was placed in a prone position on the floor of a circular communal building and covered with burnt roof debris, presumably from the intentional destruction of the building (Stordeur, 1998; Stordeur et al., 2000). The Neolithic Jerf al-Ahmar human remains is the only example to-date with a similar sequence of events as reconstructed

for Structure 2 at Kharaneh IV; where the deposition of human remains on a floor was the last event marking the end-of-use of the building prior to (their) intentional destruction by fire and infilling of the building. The decapitated individual at Jerf al-Ahmar has been interpreted as a ritual sacrifice; however, it is unclear whether decapitation was the cause of death. At the burnt village of Tell Sabi Abyad two deceased individuals were placed on the roof of a house that was then deliberately burnt (Akkermans and Verhoeven, 1995a). Pre-dating the burnt village, there is also one example of an individual bundled and placed in a small room of a building prior to its burning (Akkermans, 2008). The performance of burning a building with someone's body in it would have been a very visual (perhaps even sensuous, *sensu stricto*) way to memorialize the dead. The use of fire to mark the end of a building's use is apparent at many Neolithic sites (Croucher, 2012). Cremations, however, are rare. Like at Kharaneh IV, the individuals within the burnt buildings at Jerf al-Ahmar and Tell Sabi Abyad were only partially burned. Given the adept pyro-technological skills of Neolithic peoples, it seems likely that cremation (complete burning) of these individuals was not the goal. Indeed, the overall scarcity of cremation as a burial practice reinforces the idea that the remains of the dead were to remain somehow close to, visible or connected to specific buildings and, perhaps, the living users of these built environments.

7. Conclusions

A strong connection between the dead and architecture is apparent throughout the Neolithic. Here we provide evidence that this relationship existed already in the Early Epipalaeolithic, several thousand years earlier than previously documented, and serves to reinforce ties between a person and a structure in life, and maintained in death, with the mutual death, first of the person and then the(ir) house. What is significant in these Neolithic and, now, Early Epipalaeolithic depositional practices, is that interaction with the body are, in fact, readily apparent with the death of an individual. Burial beneath house floors suggests the dead were kept close to the living. If the first burials from Kharaneh IV associated with Structure 1 were intentionally placed beneath the floors, and the primary deposition from Structure 2 was clearly placed on the floor prior to burning, then it seems that there was a desire to link the dead with architecture—possibly to keep them close to the living. Perhaps the dead continued to influence and interact with the living after death. Even with Structure 2, where the destruction of the body and the building through fire seems to suggest some degree of finality, it is equally possible that the use of fire (a pattern seen in the end-of-life of at least three structures at Kharaneh IV) instead invokes transformation, rebirth, cleansing, or a regenerative cycle of death and life—all hut structures were sealed and evidence for subsequent occupation of the area is apparent immediately above each of them. Extending from house/burial practices of the Natufian, it seems that Neolithic groups drew on this desire to maintain connections to the dead, keeping them close by and in contexts that allowed them to continue to interact with the realm of the living (Croucher, 2012). While it is impossible to say, at this point, what the deposition of the woman in Structure 2 means in terms of the connections with the living interpreted for Natufian and Neolithic house burials, it is likely that the association of houses and burials as part of an entangled built environment has its roots in such Epipalaeolithic practices.

At a time when people were beginning to settle down in long-term, inter-generational settlements, the ways in which they made connections to places may have taken a variety of forms, and included establishing, marking or maintaining a connection to a place in death. Thus, the origins of final deposition of human remains where treatment of the dead and treatment of a house are enmeshed suggests that individuals were tied to places in life and in death; after the death of the woman in Structure 2, she may have been placed in 'her' house and both burned together to maintain that connection. The process of deliberate burning of the hut structure following the placement of human remains inside

may also be interpreted within the spectrum of the cremation of human remains, which becomes relatively common in Eurasia during the later Holocene. These practices provide unique insights into the early processes of Epipalaeolithic and Neolithic place-making. In the Neolithic, these connections expanded and extended into the realm of the living, with subfloor burials keeping the dead close to the living and entangling the dead, the living, and the house. The continued use of the physical remains of the dead (i.e., plastered skulls) by the living and proximity of these house burials to everyday life in a Neolithic community highlights potential relational identities of the living and the dead—the point at which one belongs to either realm may not be clear-cut (Bird-David, 1999; Croucher, 2012). The early origins of some of these practices in the Epipalaeolithic reminds us that people were symbolically entangled and socially interconnected with the world around them (Croucher, 2012) long before any apparent processes of Neolithization.

CRediT authorship contribution statement

Lisa A. Maher: Conceptualization, Formal analysis, Investigation, Writing - original draft, Writing - review & editing, Visualization, Supervision, Project administration, Funding acquisition. **Danielle A. Macdonald:** Conceptualization, Formal analysis, Investigation, Writing - review & editing, Visualization, Supervision, Project administration, Funding acquisition. **Emma Pomeroy:** Formal analysis, Writing - review & editing. **Jay T. Stock:** Formal analysis, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaa.2020.101262.

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