

LA TROBE UNIVERSITY'S 2014 SEASON OF GEOLOGICAL SURVEY AND ARCHAEOLOGICAL EXCAVATION AT THE NATUFIAN SITE OF WĀDĪ ḤAMMEH 27

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Introduction (PCE)

The initial field season of the *Ice Age Villagers of the Levant* project was undertaken by La Trobe University from 2 November to 21 December 2014¹. The work involved geological survey along the east Jordan Valley and its hinterland, and new excavations at the Natufian site of Wādī Ḥammeh 27 (**Fig. 1**). The project is designed to investigate the archaeological correlates of early sedentary life and social connections in the Early Natufian period. One of its key objectives is to recover human skeletal remains from the basal phases of Wādī Ḥammeh 27 in order to provide materials for isotopic investigations of occupational persistence at the settlement and palaeogenetic testing of kinship structures (Edwards 2014). To this end, the new excavations were focussed on exposing a reasonably broad area of the basal travertine layer (Phase 4), which is known to hold human burials in rock-cut pits (Webb and Edwards 2013), by stripping away the overlying occupational deposits of Phases

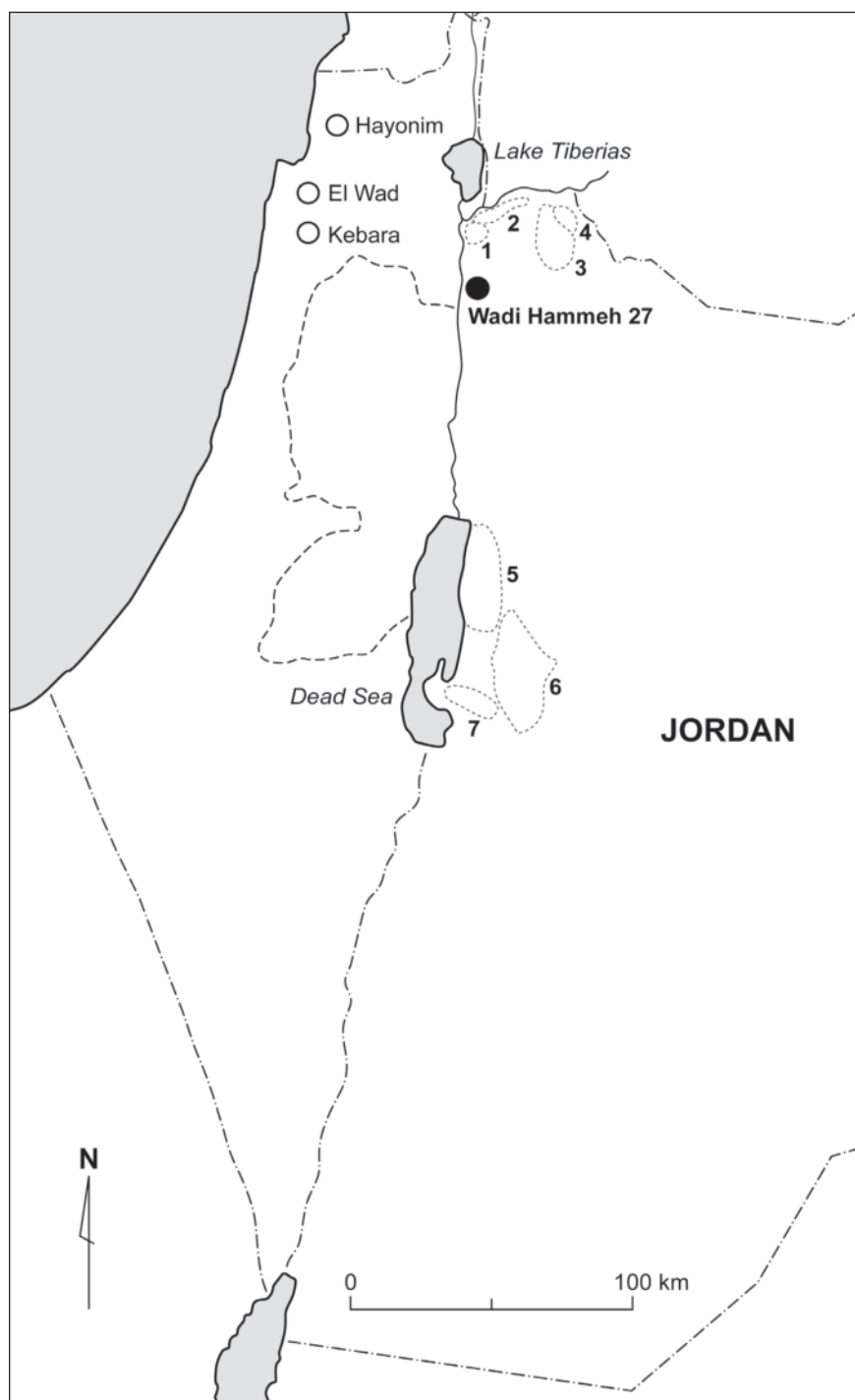
2 and 3. Concurrently, wide-ranging geological surveys were made in the east Jordan Valley and flanking regions, extending from the southern end of the Dead Sea to the Syrian border region, to investigate the sources of Wādī Ḥammeh 27 flint and basaltic rock. Additionally, sediments were sampled for the purposes of assembling a map of strontium-isotope availability for Jordan.

Provenancing of Basaltic Artifacts (JW)

In order to determine the source areas where basaltic stone was quarried, an extensive program of basalt analyses was undertaken in December 2014 using a hand-held Olympus Delta X-Ray Fluorescence Analyzer. This device analyses the surface of a sample; it is non-destructive and quick to use (90 seconds per analysis). Initial testing has shown that multiple analyses on a single artefact give results that show little variability and that the concentrations of immobile elements like niobium, zirconium and yttrium show little difference between

1. The 2014 fieldwork season at Wādī Ḥammeh 27 and other localities in the Jordan Valley and adjacent areas was undertaken as part of the *Ice Age Villagers of the Levant: Sedentism and Social Connections in the Natufian Period* project, funded by a three-year, Australian Research Council (ARC) Discovery Project grant (DP140101049). The project is based at the Department of Archaeology and History, La Trobe University in Melbourne, Australia. The fieldwork was undertaken with the gracious support of Dr. Munther Jamhawi and assistance by the staff of the Department of Antiquities of Jordan. In-field departmental staff comprised representatives Imad Obeidat, Bashar Hassan Rashid Saleh and Ibrahim Rousan. Qutaiba Dasouqi conducted a theodolite survey and aerial photography. The team is also grateful for the support of the Tabaqat Fahl office departmental inspector, Muhammad Shalabi, and his team. Jordanian house staff at Tabaqat Fahl comprised Aladdin Madi (house manager and logistics), Khalid Jawahiri (chef),

Jihad Mustafa (Umm Hamza, laundry), Salim Hmid (house guard) and house repair staff Khalal Khashashneh (Abu Khalid) and Ibrahim Sleiman. Local Jordanian excavation staff from Tabaqat Fahl and Masharia were Khalal Khashashneh (Abu Khalid), Nouredine Khalid, Ibrahim Tawfiq Muhammad, Nasr Hassan, Walid Khashashneh and site guard Yusuf Salim Hmid. Excavation work at Wādī Ḥammeh 27 was directed by Phillip Edwards and carried out by La Trobe University students Eugene Shev (field director / square supervisor), Rosemary Robertson and Adam Valka (square supervisors). Cathy Carigiet undertook drawing and artefact photography. Field scientific staff included Associate Professor (Dr) John Webb (project co-director, geology and basalt sourcing) of La Trobe University, Dr Louise Shewan (project co-director, geochemistry) of Monash University (Melbourne, Australia) / University of Warwick (UK) and Dr Christophe Delage (flint sourcing) of Le Musée de Préhistoire, Lussac-les-Châteaux, France.



1. Location of Wādī Ḥammeh 27 and other Natufian sites mentioned in the text. Identified basalt provinces are indicated by dashed grey lines: (1) Umm Qeis; (2) Yarmouk; (3) Irbid West; (4) Irbid East; (5) North-East Dead Sea; (6) al-Qasr; (7) Kerak.

weathered and fresh surfaces.

Several days were spent visiting all the significant basalt outcrops in north-west Jordan. Samples were collected from all outcrops and these were analysed at the Pella dighouse along with a number of basaltic artefacts stored there. Preliminary data analysis shows that the outcrops can be grouped into several clearly

differentiated provinces (**Fig. 1**). Preliminary analysis of basaltic artefacts from Wādī Ḥammeh 27 housed at Tabaqat Fahl shows that these can be matched to some of the provinces. Prior analyses of some basaltic artefacts from Wādī Ḥammeh 27 (Edwards and Webb 2013) indicated their acquisition from Wādī al-Mujib and Kerak, areas quite distant from the northern

Jordan Valley. Some of the 2014 analyses also point to these regions, but more extensive analyses are required before any definitive provenance matches can be confirmed.

Provenancing of Cherts (CD)

During the 2014 season, a geoarchaeological survey was conducted along the east Jordan Valley in order to study chert and flint availability and to determine the range of cherts utilised at Wādī Ḥammeh 27. Six primary chert-bearing formations were the target of fieldwork (Abdelhamid 1995; Abu Qudeira 2005; Moh'd 2000). Dated to the Cenomanian, the Naur Limestone Formation (NL) is the oldest one containing cherts; it was noted as yielding very small and irregular chert nodules in Wādī Kufranja. These silicifications are sparsely dispersed in a hard limestone and are thus difficult to extract. Turonian flints of the Wādī as-Sir Limestone Formation (WSL) are found north of Kfar Abil and in Wādī Jirm. They are embedded in a hard dolomite as small, irregular nodules and quartzolites, and are also difficult to extract. Close to Ashrafiyya, a small outcrop dated to the Santonian yielded cherts of the Wādī Umm Ghudran Formation (WG). A single bed of these siliceous rocks is present in a hard limestone. The next chert-bearing geological stage, the Amman Silicified Limestone Formation (ASL), is dated to the Campanian. As opposed to the previous formations, where silicifications are quite rare, ASL cherts are abundant in the various outcrops visited in the Kfar Abil / Ashrafiyya area. Numerous silicified beds are present superimposed within a limestone matrix. The following stage, the Muwaqqar Chalk-Marl Formation (MCM), of Maestrichtian - Palaeocene age, is also very rich in silicifications in the various valleys of the region (e.g. Wādī al-Ḥammeh, Wādī al-Jirm and Wādī ash-Shallala). MCM cherts are present as sub-spheroidal nodules spread in limestone or superimposed beds; quartz veins were also noticed in Wādī al-Ḥammeh. The sequence of primary chert-bearing deposits ends with the Umm Rijam Chert-Limestone Formation (URC) of the Lower - Middle Eocene. The valley slopes where this formation outcrops are covered with an abundance of chert nodules and beds.

Secondary deposits were also monitored during the survey. Primary chert-bearing outcrops in the east Jordan Valley are usually located in the high foothills. These geological formations are cut by erosion that has rolled the siliceous pebbles and cobbles down the slopes. Intense erosional processes have taken place in the region since the Miocene and thus valley bottoms yield Miocene to Pleistocene conglomerate deposits, as well as recent loose sediments, including numerous eroded chert nodules of smooth, cortexless types. Thus, close to the site, in Wādī Ḥammeh, the stream bed is particularly rich in siliceous nodules. No *in situ* chert-bearing deposits outcrop in this section of the Jordan Valley. Overall, the Natufian inhabitants at Wādī Ḥammeh 27 had available to them a rich and diverse array of mineral resources, including chert nodules. These could be collected in both primary (upstream outcrops) and secondary (downstream conglomerates and *wadi* cobbles) deposition contexts.

In the course of the survey, numerous geological chert samples were collected in order to establish a reference collection that is currently stored at the Pella dighouse. A comparison of these geological chert types with the archaeological specimens will ultimately help to establish the origins of the lithic raw materials used at the site. Overall, the macroscopic approach implemented in this typological analysis has revealed its potential to differentiate chert types according to specific geological formations, and several were identified. A wide range of cherts was exploited by the inhabitants of Wādī Ḥammeh 27. The archaeological specimens examined during the 2014 season displayed an eroded and battered surface (= neocortex) reflecting secondary contexts of deposition whereas the rich, chert-bearing outcrops upstream were not represented. There was evidently a strong emphasis on the procurement of a few lithic types, especially one designated as Type 04. This is a yellow-brown chert, easily recognizable macroscopically, which is found in secondary deposits. However, it is not a type that is particularly abundant in Wādī al-Ḥammeh. At this stage, there does not seem to be any geological phenomenon to account for the unusual abundance of this specific type in the Wādī Ḥammeh 27 lithic assemblage.

Sampling Survey Towards a Bioavailable ($^{87}\text{Sr} / ^{86}\text{Sr}$) Isotope Map (LS)

In archaeological studies, strontium (Sr) isotope ratios are measured in human skeletal material to determine residential behaviour and resource acquisition strategies of past populations. The isotopic composition of the enamel of human teeth provides a signature of early life reflecting the geological regime where individuals spent their childhoods. In order to examine prehistoric residential behavior, a baseline reference map of bioavailable Sr isotope variation is required. Prior analyses (Shewan 2003, 2004) have demonstrated the distinctive isotopic signature of Wādī al-Ḥammeh sediments relative to surrounding geological provinces and indicated that some Wādī Ḥammeh 27 occupants had lived in the valley for extended periods while others had lived elsewhere.

Strontium isotope ratios vary in rock according to the age and composition of the material (Faure and Powell 1972). Through weathering, this variability is carried to the soils and ground and surface water, and is inherited by plants growing in the area to be absorbed into the bones and teeth of animals higher in the food chain (Capo *et al.* 1998; Ericson 1985). While geological maps are a useful starting point to assess this isotopic variability in the region, biologically available strontium may differ from whole rock and soil ratios as a function of preferential weathering, atmospheric deposition and mixing processes (Sillen *et al.* 1998). To address this issue 70 plant, soil and soil leachate samples were collected throughout north-west Jordan during the first season of fieldwork and will be analysed to produce a bioavailable Sr isotope map of the region. The samples are presently undergoing isotopic analysis at the Australian National University using a thermal ionisation mass spectrometer (TIMS).

Excavations at Wādī Ḥammeh 27 (PCE)

Aims and Methods

The first series of excavations at Wādī Ḥammeh 27, undertaken between 1983 and 1990, saw the clearance of a large exposure of the uppermost occupational deposits (Phase 1), with only a small pit (the Plot XX F sondage) reaching the base of the site (Edwards 2013a).

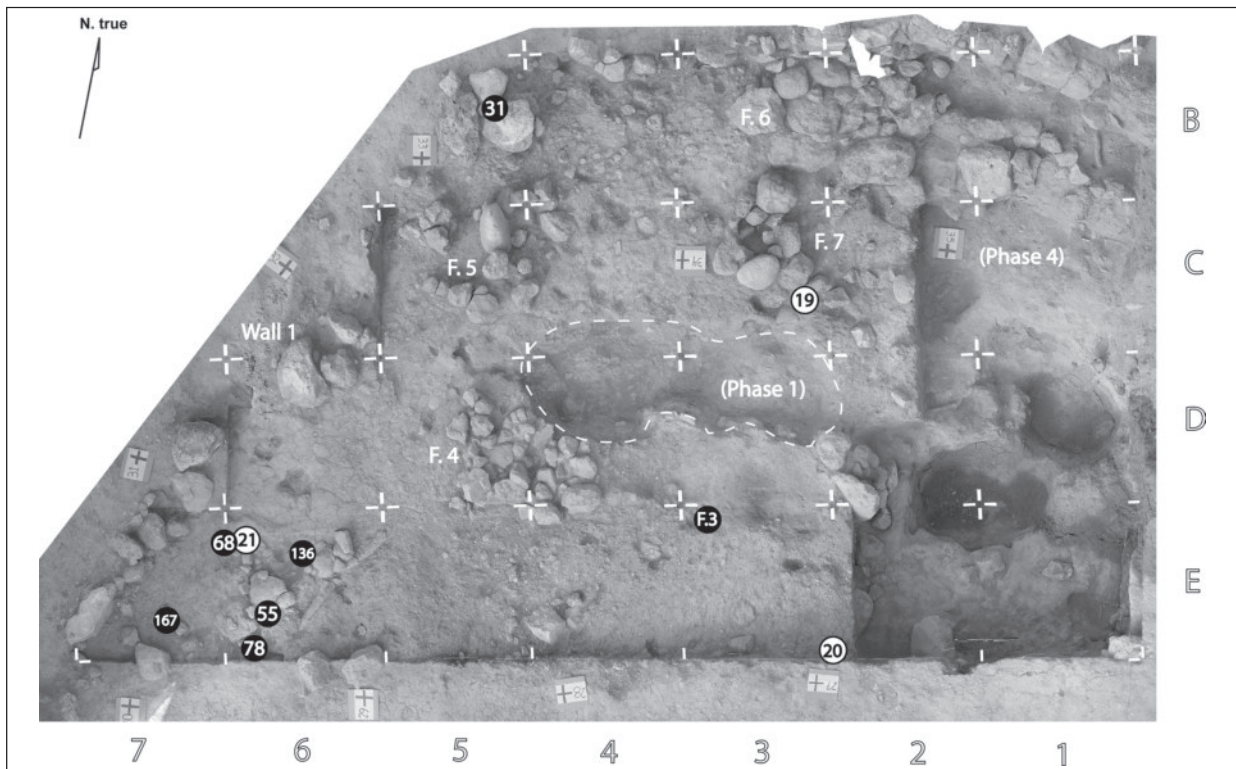
The 2014 excavations were directed westwards from the Plot XX F sondage in order to remove sediments overlying the lower occupation surfaces, in a rectangular excavation plot 7.5 metres long by 3.5 metres wide superposed over the easterly parts of Plots XX F and the XX E/F baulk (**Fig. 2**). At the conclusion of the 2014 season, an area of 15.5 square metres of the Phase 2 occupation surface had been revealed under the northern half of Structure 1. The new excavations did not extend to all boundaries of this plot but were restricted within Structure 1's perimeter wall in order to preserve this significant example of Natufian architecture. To maintain continuity with the prior excavation system, the 'Locus / Level' terminology was employed for delineating natural stratigraphic distinctions, with a subordinate system of artificial units dug to a maximum depth of 0.2 metres (McNicoll 1992: xiii-xvii; Edwards 2013b). Horizontally, the excavation plot was divided into a grid of one-metre squares. All excavated matrix was dry-sieved and then wet-sieved through 1-millimetre mesh screens, and a series of oriented sediment samples with accompanying loose sediment samples was taken from the southern baulk of the Plot XX F sondage.

Excavation Results

The excavations of Phase 2 yielded a coherent and continuous earthen floor surface lying about 0.2 metres below the Phase 1 floor. The floor layer supported several stone features and artefact clusters, and the overlying deposit (Locus 2.5) produced a high density of finds, similar to the levels previously recorded for the uppermost Phase 1 (Edwards and Hardy-Smith 2013).

Constructed Features

The excavated areas within the square-metre grid belong to Phase 2 except where indicated in (**Fig. 2**), namely the Plot XX F sondage to the right of picture, previously excavated to bedrock (Phase 4), and an elongated pit (in Squares C-D / 2-4) dug from Phase 1. A broad wall segment (Feature 5a [=F. 5a]), which was first revealed in the XX F sondage, continued westwards (as Feature 6) for 2.82 metres across Squares B2 and B3; it is 0.87 metres wide (north - south axis). Based on the excavations in the



2. Aerial view of Phase 2 occupation surface (Plot XX F) excavated at Wādī Ḥammeh 27 in 2014; each grid square measures 1 metre by 1 metre. The earlier 'XX F sondage' (Phase 4) is located to the right and a pit dug from the later Phase 1 is indicated by a dashed line; white discs indicate the locations of 'Artefact Clusters'; black discs indicate the location of features and artefacts cited in the text.

XX F sondage, it had been surmised that F.5a was the Phase 2 predecessor of Structure 1's perimeter wall (Wall 1) and associated with the Phase 2 floor. However, excavations in Squares B2 and B3 revealed that this platform of large, jumbled stones slopes up to and abuts Wall 1. This feature was already in use in Phase 2 (Square B3), if discontinuously. It is associated with Phase 2 occupation surfaces in Squares B2, B3, B5 and C5, but not in Square B4 where its constituent stones are pedestalled above the Phase 2 floor.

Three principal features are located on the Phase 2 floor. Feature 7 (Square C3) is a stone ring built up two courses high. It is an early version of the same feature that continued in operation in Phase 1 (Edwards 2013c: 73). Feature 5 is a sinuous stone arrangement, a composite of adjoining stone arcs, opening respectively to the north (Square C5) and to the south (Square C4), bedded in mud mortar on the Phase 2 floor (Squares B5 - C4/5). Feature 4 (Square D5) is an oblong stone platform that extends east to Square D4 and south into

Squares C4 and C5. It is partly truncated by the pit in the north-eastern corner of Square D5. A flat stone is placed at the centre of the stone group and the feature may have functioned as a post-support, as did several similar features in Phase 1 (Edwards 2013c: 71).

Artefact Clusters 19 - 21

The first series of excavations at Wādī Ḥammeh 27 brought to light caches of artefacts and materials, or 'artefact clusters' found in close and patterned association, indicating purposeful placement made synchronously or over a relatively short period of time (Edwards and Hardy-Smith 2013: 105). Artefact Clusters 1 - 17 occurred in Phase 1 contexts and Artefact Cluster 18 was found in Phase 2. The present season yielded three additional clusters on the Phase 2 floor (indicated as numbered white discs in Fig. 2).

Artefact Cluster 19 (Square C3-1, Locus 2.5) consisted of a pair of large flint blades (RN 140006 and RN 140007) nearly 10 cm long, an

unusually large size for Wādī Ḥammeh 27 (Fig. 2:19).

Artifact Cluster 20 (Square E3-2, Locus 2.5) was a pile of five stones (Fig. 2:20; Fig. 3), comprising three lightly reduced and apparently



3. *Artifact Cluster 20*: a pile of flint cores and limestone cobbles.



4. *Artifact Cluster 21*: a scatter of 138 dentalium (*Antalis* sp.) fragments overlying a pair of retouched blade tools.

heat-treated flint cores (RN 140026, RN 140028 and RN 140029) and two limestone cobbles (RN 140025 and RN 140027).

Artifact Cluster 21 (Fig. 2:21; Fig. 4) comprised a cache of 138 dentalium (*Antalis* sp.) fragments (not counting further fragments that may be discovered in the sieve residues) overlying a pair of retouched blade tools, including a Helwan-retouched awl. The allocation of these objects alone to *Artifact Cluster 21* is a conservative assessment, given the agglomeration of other finds that Feature 10 nestled amongst in Square E6 (Fig. 5). They include a zoomorphic basaltic pestle (RN 140049; Fig. 2:68), a phalliform figurine (RN 140225; Fig. 2:136), a basaltic shaft-straightener (RN 140047; Fig. 2:55) and a basaltic handstone (RN 140048).

Bone Artifacts

Bone tools were few but significant, including the curved end of a sickle haft (RN 140001), the tip of a bone point (RN 140004) and a complete but fragmented bone polisher (RN 140005).



5. View south across the Phase 2 floor; Square E6-1, indicating Artefact Cluster 21 - a cache of dentalium fragments - at lower right. Further to the right-hand corner is a zoomorphic basaltic pestle (RN 140049), then - proceeding clockwise - a basaltic handstone (RN 140048), a phalliform figurine (RN 140225) and a basaltic shaft-straightener (RN 140047).

Flaked Stone Artifacts

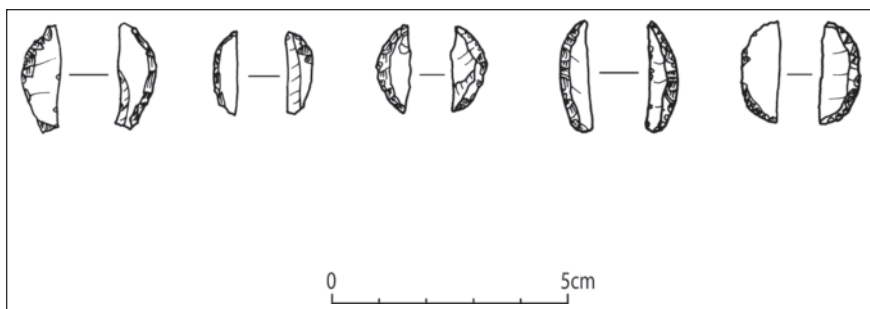
While the flaked stone assemblage has not yet been sorted and catalogued in detail, all retouched specimens recovered during the season were consistent with the previously recovered lithic assemblage. Helwān (bifacial marginal) retouch is consistently applied to small tools, for example to lunates (Fig. 6).

Groundstone Artifacts (AMV)

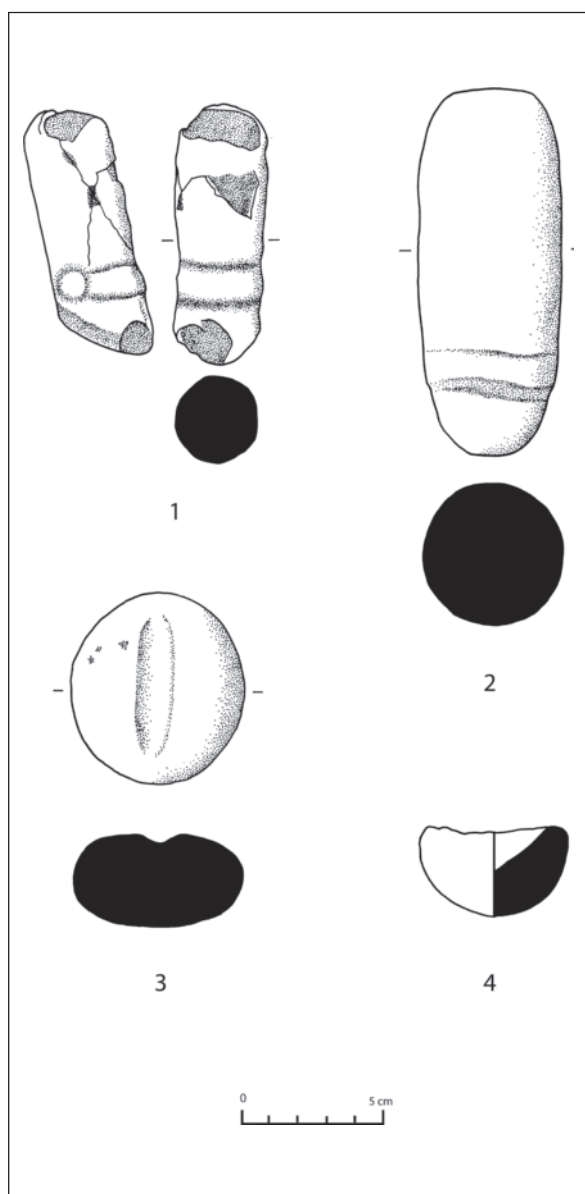
Pestles

Two intact and four broken pestles were recovered, all made from basaltic stone aside from one limestone medial fragment. The

pestles are cylindrical in plan with spherical sections, except for RN140010, which has an unusual oblique termination. The termination of another broken pestle (RN140009) is slightly flaring, thus qualifying this artefact as a knobbed pestle (No. 69 in Wright's 1992 catalogue). Both this pestle and RN140010 were recovered on the Phase 2 floor within the same unit (Plot XX F, Locus 2.5, Square C2-1). The most notable finds in the class are two diminutive pestles (Figs 7:1-2): the first a zoomorphic pestle (RN140049) and the second a phalliform basaltic pestle (RN140053). These items are described in more detail below.



6. Helwān-retouched lunates from Phase 2.



7. (1) Zoomorphic basaltic pestle [RN 140049]; (2) phalliform basaltic pestle [RN140053]; (3) basaltic shaft-straightener [RN 140047]; (4) miniature basaltic bowl [RN 140022].

Handstones

Three intact handstones and one broken handstone were discovered. A basaltic handstone with lenticular section (RN140059) was recovered in Square E7-1, placed against the perimeter Wall 1, near to the phalliform pestle, RN 140053. Five smoothed flake scars are present along one margin; both faces of the object are coated in yellow ochre, with stains covering 95% of one face and 80% of the other, whereas the margins are completely free of them. Upon its removal from the Phase

2 floor, the area it had covered was also found to be stained yellow. Another broken limestone handstone (RN 140024) also bore traces of yellow colouration. RN 140048 is an unusual unifacial basaltic handstone with a wide ovate depression on its curved, upper surface. A flake scar lies adjacent to the depression.

Mortars and Large Vessels

A rim fragment of a large basaltic mortar (RN140215) was discovered in Square E5-1. The interior of this artefact is meticulously smoothed, whilst the exterior is less well-finished. The rim is ground flat. Another basaltic vessel fragment (RN140217), possibly from a mortar, was found in the same unit.

Miniature Bowls

Three miniature basaltic bowls were excavated. Only one, a globular bowl (RN 140022) found lodged between stones of Wall 1 in Square B5, is complete (**Fig. 2:31; Fig. 7:4**). Of the two other fragmentary vessels, RN 140054 has a globular body similar to the previous item whereas the other (RN 140227) features a much shallower cavity. All three objects display carefully manufactured rims, bases and interiors. Traces of drilled depressions, possibly pilot holes, are present at the deepest interior points of both RN 140022 and RN 140227.

Grooved Stone (Shaft Straightener)

A small basaltic shaft straightener (RN 140047) with discoidal shape and lenticular section was found on the Phase 2 surface in Square E6-1 (**Fig. 2:55; Fig. 7:3**). A U-shaped groove is worked into one face, 55 mm long, 12 mm wide and 7 mm deep. Neither end of the groove extends to the edge of the piece.

Varia

A small limestone spheroid (RN140060) was recovered in Square E7-1. Its use as a hammerstone is unlikely on account of the soft limestone it was made of, as well as the absence of pounding damage.

Worked Fragments

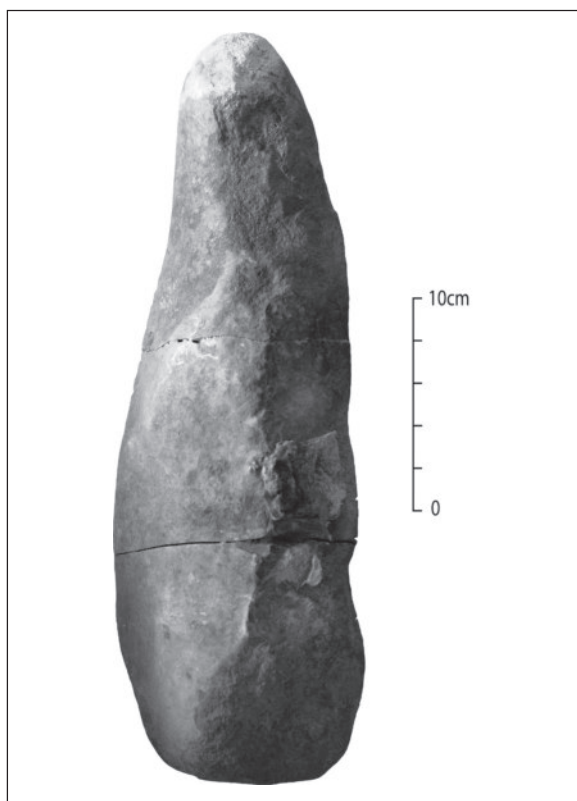
Ten worked limestone fragments, not identifiable to artefact type, were also found.

Art items (RR)

Five art items made from stone and bone, bearing representational and geometric motifs, were recovered from Phase 2:

RN 140049: Zoomorphic Pestle (Square E6-1; Fig. 2:68; Fig. 7:1)

This piece is a relatively short (9.4 cm) and gracile (diameter = 3.1 cm) basaltic pestle with a convex proximal end and zoomorphic distal terminus, slightly fractured and exfoliated. Its key decorative features are a raised band, circumscribing the shaft near the distal end, approximately 1 cm in width and standing approximately 0.3 cm proud of the surface, and an obliquely shaped terminus. The features suggest an ungulate or equine hoof. The piece finds several Early Natufian parallels in objects from Mount Carmel and western Galilee, such as a basalt pestle with concentric raised bands and another with a hoof-shaped terminal from El Wad (Garrod and Bate 1937: pl. XV: 4; Major 2012: 226-228) and examples from Hayonim Cave (Belfer-Cohen 1991: fig. 7:1, 3, 5).



8. Phalliform limestone figurine (RN 140225).

RN 140053: Phalliform Pestle (Square E7-1; Fig. 2:167; Fig. 7:2)

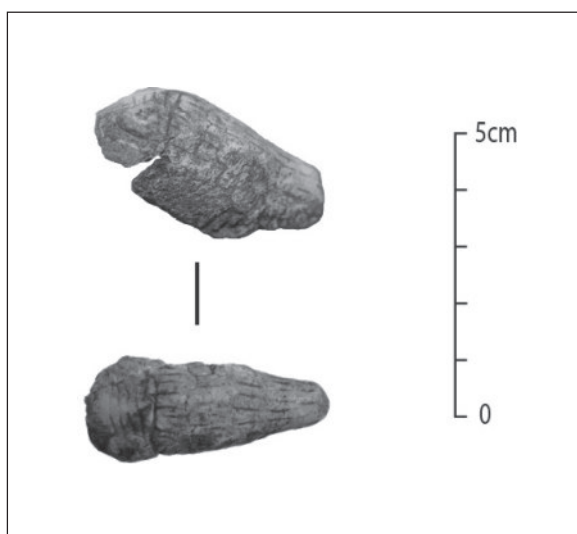
This is a short (13.7 cm), robust, basaltic pestle with a raised band circumscribing the object near its distal end, approximately 0.5 cm proud of the shaft. The distal end of the piece is lightly grooved. Overall, the decorative embellishments convey the impression of a phallic object.

RN 140226: Carved and Incised Bone Animal Head (Square E6-1; Fig. 2:78; Fig. 9)

Apparently the terminal fragment of a larger object, this is a small (length = 4.2 cm), carved and incised, animal-headed figurine. The piece is broken at the 'neck'. It has been calcined through burning, resulting in breakage and extensive exfoliation at its base and along

RN 140225: Phalliform Limestone Figurine (Square E6-1; Fig. 2:136; Fig. 8)

This long (33.5 cm), sub-conical piece of limestone tapers from 10.9 cm in width near the distal end to 5.2 cm near the proximal end. The piece was found complete, although cracked *in situ*, and consists of three conjoinable fragments. A natural white colouration caps the thinner proximal end of the piece, whereas the rest of the object is light grey to dark grey. In particular, a dark grey region extends below the white cap, down the right lateral margin. This area has been reduced by pecking, emphasising the white area above it. The manner in which the object has been shaped and its decoration suggests an intention to form a phallic symbol.



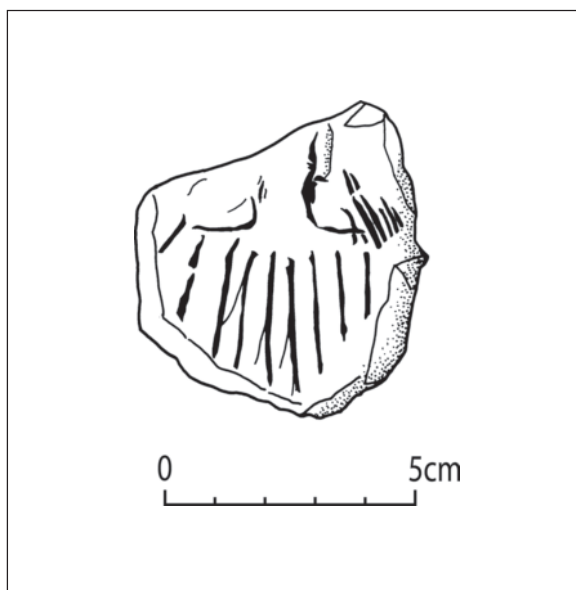
9. Carved and incised bone animal head (RN 140226).

the left and right lateral margins. Despite the extensive damage caused by burning, the fine modelling of the piece is evident and the form of the head of an ungulate animal, probably a gazelle, is compelling. The ears are represented by two bumps, the left one complete but the right one damaged. The eyes are also rendered by two raised areas which grade into a narrow muzzle. The snout is slightly everted, terminating in a disc that represents the nostrils. The base of this feature is defined by an incised line which continues around the left side of the muzzle. Below this, a more deeply incised line represents the mouth. The frontal region of the head is marked between the ears by opposed sets of short strokes, the left set comprising four strokes and the right set five strokes. The face is demarcated from the frontal region by a deeply incised line that runs across and cuts through the lower margin of the left ear. Surface damage interrupts the line slightly before it reaches the right ear. The muzzle is marked by five rows of longitudinal, incised strokes running all the way to the snout. They comprise sets of ten, seven, six, eight and five. Incised strokes were originally more extensive over the piece, but fire damage has removed them.

RN 140226 has parallels with objects from Kebara Cave and El Wad Cave. Layer B (Plot XXVII) of the former site yielded a complete bone sickle haft with a zoomorphically rendered terminal, fashioned to resemble an ungulate (Turville-Petre 1932); Layer B2 of the latter site produced an animal figurine surmounting a haft, described as a 'young deer'. The body of this image also bears sets of short, parallel strokes like those on RN 140226 (Garrod and Bate 1937: pl. XIII: 3).

RN 140052: Incised Limestone Piece (Surface Find; Fig. 10)

This is a smoothed, roughly pentagonal limestone fragment with one incised face and the other left blank, smoothed by abrasion and polishing. The key features of the decorated face comprise nine deeply incised longitudinal lines descending from a broad, shallow band located about two-thirds of the way up the field. Lighter and finer diagonal lines run between the third and fourth, fourth and fifth, and fifth and sixth heavy lines. The upper register is



10. Incised limestone piece (RN 140052).

dominated by two raised oblong panels; on the right-hand one, six successively finer lines have been carved on the diagonal leading towards but not meeting the right lateral margin. Short, irregular vertical strokes also appear on the left-hand panel and in between the two panels. The decoration appears as a geometric pattern; however, viewed the other way up, the piece suggests an anthropomorphic theme, with hair or a headdress surmounting a nose and two eyes.

Human Skeletal Remains (PCE)

An isolated human molar was found in Square E4-1.

Palaeogenetic Analysis (CV)

Studies of ancient DNA (aDNA) from well-dated contexts potentially enable a precise understanding of past human genomes, origins, genetic variation, migrations and extinctions. However, it is well-known that not only age but also environment affects the preservation of aDNA. The samples under study in this project are expected to be highly degraded, not only as a result of their antiquity (12,000 - 12,500 cal BC) but also as a result of the seasonally wet and dry environments they have been exposed to over time. Preliminary results on a human third molar from the Plot XX J burial at Wādī Ḥammeh 27 (Webb and Edwards 2013a) determined the presence of

endogenous (non-contaminant) human DNA, validated with the observation of damage patterns unique to ancient molecules (Sawyer *et al.* 2012). As with many ancient human DNA studies, a great amount of exogenous DNA (contamination) was obtained in this analysis. Of the 7,537,168 DNA sequences retrieved from the sample, only 0.19% were mapped to the human genome (Hg19). However, the damaged patterns observed, together with the presence of human DNA, are indicative that small amounts of endogenous DNA are still present in the sample. These preliminary results are encouraging for further analysis on samples from the site of Wādī Ḥammeh, using methods and technologies available in the fields of aDNA and molecular biology to recover and sequence highly degraded DNA.

Avian (Stork) Pes (Feature 3) (ES)

During the 2014 excavation season, an articulated distal portion of an avian pes (F. 3) was recovered from Square E3-2 (Locus 2.5). The specimen included several phalanges articulated with the fragmented distal end of a tarsometatarsus (**Fig. 11**). The arrangement and preservation of these remains permitted osteometric analysis. The breadth of the tarsometatarsus, phalanx length and the osteomorphology of the specimen suggest a ciconid (stork) attribution. The breadth (Bd) of the distal tarsometatarsus is 20 mm, similar to Ciconiidae specimens B.30249 *Ciconia* sp. (Bd = 19.5 mm) and B14141 *Ciconia ciconia* (Bd = 18 mm) in the avian collection at Melbourne Museum. The largest phalanx (proximal third) yielded a greatest length (GL) of 39 mm in the Wādī Ḥammeh 27 specimen and GL = 38 mm in specimen B.30249, indicating *Ciconia* sp. (Driesch 1976: 121, 129). The fragmented remains of trochleae II and IV also appear to be flattened anteriorly rather than rounded - a Ciconiidae trait (Haarhoff 1988). Two species of Ciconiidae have seasonal migration routes that pass through the Levant (Porter *et al.* 1996: 20-21): *Ciconia nigra* (black stork) and *Ciconia ciconia* (white stork). Notably, the white stork was the most abundantly represented bird species in previous analyses of faunal material from Wādī Ḥammeh 27 (Edwards and Martin 2013: 340). The modern migration route of



11. Articulated avian pes (*Ciconia* sp.) lying on the Phase 2 floor in Square E3-2.

the species passes through parts of the Levant, including the Jordan Valley.

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