LA TROBE UNIVERSITY'S 2016 SEASON OF FIELD SAMPLING AND ARCHAEOLOGICAL EXCAVATION AT THE NATUFIAN SITE OF WĀDĪ ḤAMMEH 27

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Introduction

The third field season of the 'Ice Age Villagers of the Levant: Sedentism and social connections in the Natufian period' project was undertaken by La Trobe University from November 3 to December 17, 2016[1]. The operation was the third year of excavations (following two earlier seasons in 2014 and 2015) of the Early Natufian site at Wādī Ḥammeh 27, near Ṭabaqat Faḥl (Pella). It also included sampling programs in the field and analysis of stored collections. Fieldwork included micro morphological sampling of Wādī Ḥammeh 27 sediments (L. Prossor), further field sampling of vegetation in north-western Jordan in order to compile a map of bio-available strontium (L. Shewan), and sampling of human skeletal remains from Wādī Ḥammeh 27 and later period specimens stored at the Pella dighouse for ancient DNA analyses (C. Valdiosera). Meanwhile, cataloguing and analysis of Wādī Ḥammeh 27 materials continued, including lithics (A. Valka) and human skeletal remains (F. Bocquentin and M. Anton).

The 2016 excavations yielded key examples of previously known artefacts, entirely new types of artefacts, and important discoveries about the extent and character of Wādī Ḥammeh 27. In many cases, the new evidence forced revision of longstanding interpretations about the settlement. New discoveries and perspectives include:

- A possible doubling of the previous estimate of the site area.
- The first broad exposure of the basal Phase 4.
- Several new primary inhumations.
- Important examples of new bone artefact types in a mortuary context.
- The first evidence for on-site manufacture

1. The 2016 fieldwork season at Wādi Ḥammeh 27 and sampling programs were 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 the assistance of the staff of the Department of Antiquities of Jordan, under Excavation Permit 2016/72. In-field Department of Antiquities' staff were representatives Musa Malkawi and Muhammad Shalabi. Ehab Jariri undertook survey and assembled an aerial photographic mosaic image of the excavations at Wādi Ḥammeh 27. Jordanian house staff at Tabaqat Fahl were Alladīn Madi (house manager and logistics), Khalid Jawahiri (chef), Nawal Tawfiq (laundry), Salim Hmid (house guard) and finds processors Nasr Hassan, Tail Ayyad, Widad Hamdan, Naila Nawaf, Khalal Khashashneh, Ibrahim Tawfiq Maadi, Muhmmad Abdullah and Nasr Shaati, The local Jordanian excavation staff from Tabaqat Fahl and Masharia were Khalal Khashashneh, Ibrahim Tawfiq Maadi, Muhmmad Abdullah, Nasr Hassan, Nasr Shaati and Walīd Khashashneh. Yusuf Salim Hmid acted as site guard. Excavation work at Wādi Ḥammeh 27 was directed by Phillip Edwards and carried out by doctoral students Adam Valka (La Trobe University), Lauren Prossor (Australian National University), and Marie Anton (Université Paris 1 Panthéon-Sorbonne). Rosemary Coates (University of Newcastle, New South Wales) undertook drawing and planning, while Isabella Capezio (RMIT University and Photography Studies College, Melbourne) was the project photographer. Project field scientific staff included Dr Louise Shewan (project co-director, Monash University [subsequently University of Melbourne])), who conducted a bio-available strontium isotope survey, Dr Fanny Bocquentin (French National Centre for Scientific Research (CNRS), Maison Archéologie et Ethnologie René Ginouvès - UMR 7041, France), who supervised the excavation and analysis of human skeletal remains, and Dr Cristina Valdiosera (La Trobe University) who conducted a sampling program for ancient DNA analysis. Thanks are due to Dr Stephen Bourke for arranging the use of the Pella dighouse and permission to sample human bones from the Pella collection.

of basaltic artefacts.
- Examples of rare limestone and basaltic querns and mortars.
- Additional evidence for the production and discard of lithic types.
- A change in the types of pigmented earth (ochre) utilized.
- New examples of fossils
- Insights into the foundation of the Wadi Ḥammeh 27 settlement.

Excavations at Wādī Ḥammeh 27 in 2016

Introduction

The 2016 excavations in Plot XX F at Wādī Ḥammeh 27 reached the natural travertine bedrock. The 2014 excavations had cleared Phase 2 deposits over the entire targeted area (Edwards *et al.* 2015). The 2015 excavations reached the Phase 3 (Upper) deposits underneath that, revealing an oval house (Structure 3) in the south of the Plot, and some Phase 4 deposits in the north of the plot (Edwards *et al.* 2016). The 2016 excavations, which are the subject of this report, cleared Phase 3 (Lower) in Structure 3 and underlying Phase 4 deposits throughout the plot.

The 2016 excavations employed the same methodologies as used in 2014 and 2015. Operations proceeded in Plot XX F and the XXE/ XXF baulk, up to the perimeter wall of Structure 1 from Phase 1, marking out a zone of operations 7.5 metres long by 5.0 metres wide, with the long axis oriented east-west. Grid squares were laid out using surveyed points established by total station survey (by Ehab Jariri), and absolute elevations of each phase and significant features were recorded. Geo-rectified, overhead photograph mosaics of each phase, and baulk-section photographic mosaics, were also compiled by total station survey.

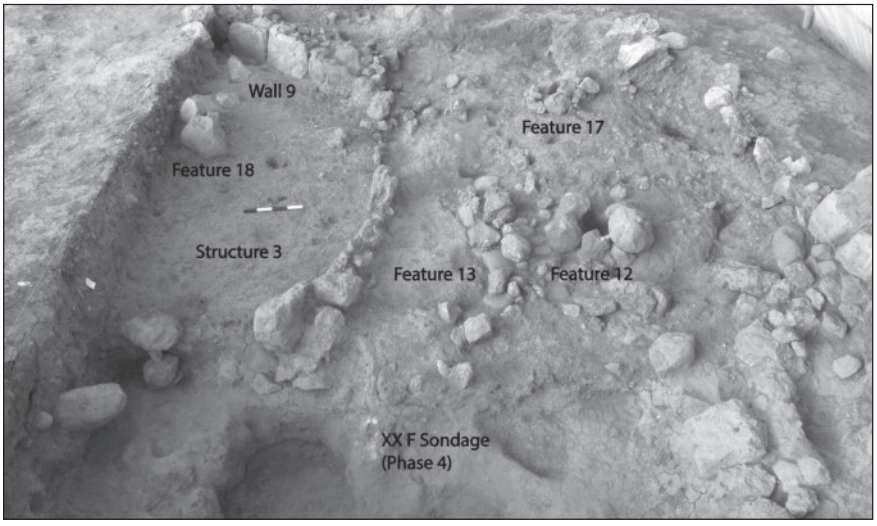
Excavation proceeded according to natural stratigraphy, supplemented by the square-metre grid (Squares B2 to E7) and arbitrary vertical units. All excavated matrix was dry-sieved through a 1-millimetre mesh, with residue returned to the Pella dighouse and wet-sieved through a 1-millimetre mesh. All wet-sieved finds from the three seasons were processed and sorted in 2016 by a team of local workers and foreign academic staff. The excavation trench was lined with plastic and backfilled at season's end.

The general run of operations, including the details of each grid-square, were described in field notebooks illustrated by plans and photographs. Stratigraphic layers were also recorded on context sheets and a measured section drawing was taken of the south baulk. Hand-drawn measured plans were made of Phase 3 (Lower) and Phase 4. Geo-rectified overhead digital photomosaics were also taken of Phase 3 (Lower) and Phase 4. Additionally, a geo-rectified, vertical photomosaic was made of the south baulk section. Significant finds were recorded in a registration book, with each find entered as a Book Number (BN. 300001 onwards). Finds considered to be of particular interest were also given a Registration Number (RN. 1600001 onwards). These objects were photographed, with some also drawn.

Excavation of Phase 3 (Lower)

Previous excavations in 2015 had revealed a house (Structure 3), defined by a substantial stone wall (Wall 9). This structure emerges from the south baulk of the trench in Square E6 and loops around in a semi-circle, returning to the south baulk in Square E1, further east (In the Plot XX F Sondage, dug in the 1980s). Structure 3 was the major constructed feature of Phase 3 and a floor (Locus 6.1) was associated with it, intercepting Wall 9 midway up and partially covering its wall stones (**Fig. 1**). An entrance was positioned in the northern side of the structure, and opposite this a stone cairn was placed on a raised clayey knoll (Feature 18 [F.18]).

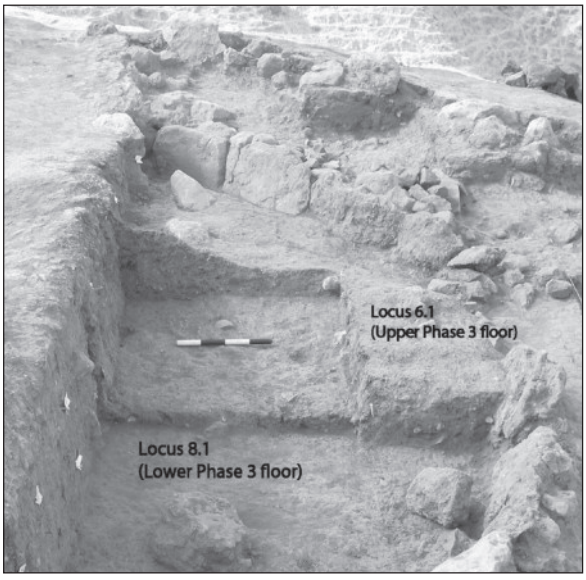
Excavations in late 2015 and in 2016 discovered an earlier, basal Phase 3 floor (Locus 8.1) within Structure 3, lying below the upper one (**Fig. 2**). This lower surface is the earliest floor of Structure 3, and articulates with the base of its enclosing Wall 9. Excavation of the lower floor also established Feature 24 (**Fig. 3**) as a clear, north-facing entrance to the house. Small packing stones supported or lay adjacent to the larger wall stones, framing each side of it. The house interior is lower than the outside surface (Locus 9.1). There is a small stone-lined posthole (F. 22) on the inside of the entrance near its western end. Towards its eastern end is Feature 23, a large stone that abuts a rounded basaltic artefact (RN 160420)



1. View west over the Phase 3 excavation in Plot XX F at Wadi Ḥammeh 27; conclusion of 2015 Excavations.

sitting vertically. Opposite the entrance, a stone construction (F. 21) directly underlay the larger stone cairn (F.18) founded on the Upper Phase 3 floor (**Fig. 4**). A single large stone was found on the floor at the eastern end of the structure. Sediment on the interior of Structure 3 during Upper Phase 3 and Lower Phase 3 accreted more thickly (and probably more rapidly) than on the exterior surfaces, which change very little over the same periods.

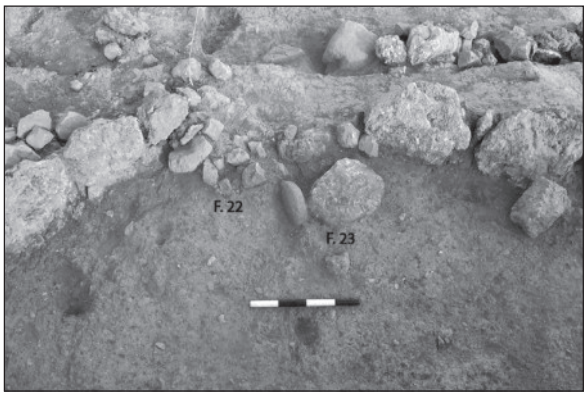
On the exterior, a large stone circle (F. 25) was positioned in Locus 9.1 at the north-west extremity of the excavations, directly underneath a similar feature (F. 17) built in the overlying Upper Phase 3. To the north-east of the excavation area, a short, single-coursed wall segment (F. 28) runs westwards from the easterly limit of excavation. This feature partially underlay an overlaying stone circle in Upper Phase 3 (F. 12). The largest feature on the exterior of Structure 3 is Feature 20, an oblong stone platform with a roughly circular cavity at its centre (**Fig 9**). Feature 20 is the original version of similar platforms which were built over the top of it, or nearby, in all succeeding constructional phases. A large, roughly circular cavity occurs at its centre, and the provision of a curved, basaltic vessel fragment (RN 160249) to frame its south-easterly margin reinforces the impression that it served as a support for a sizeable post.



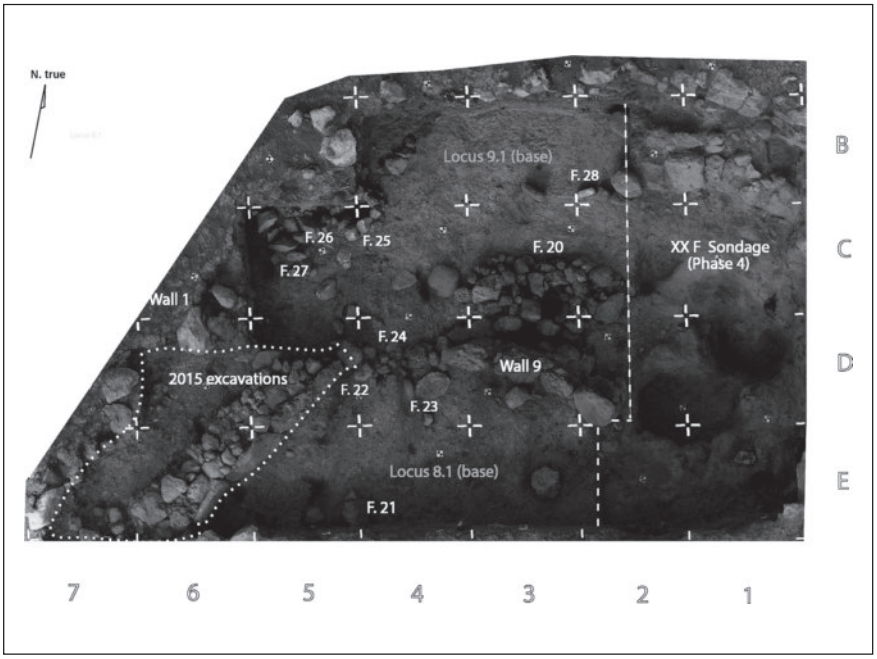
2. Upper Phase 3 and Lower Phase 3 floor layers of Structure 3; view west.

Excavation of Phase 4

After Lower Phase 3 was completed, the underlying Phase 4 was excavated. Phase 4 includes the deposits and features positioned on

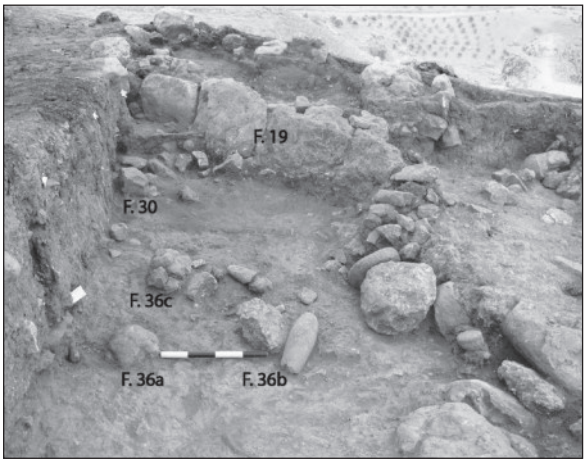


3. Entrance (F. 24) to the lower Phase 3 floor of Structure 3; view north. A small stone-lined posthole (F.22) lies near its western end, and an unfinished basaltic artefact (RN 160420) lies on its side near its eastern end.



4. Overhead view of Lower Phase 3 in Plot XX F.

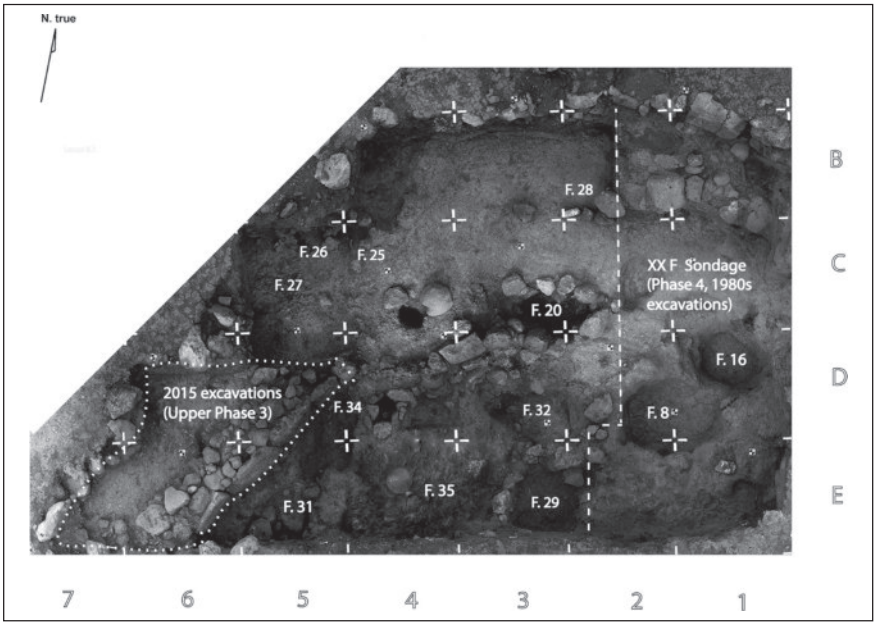
and dug into the basal travertine rock layer. The Phase 4 surface (Locus 8.3) ran underneath the major stones of the Structure 3 perimeter wall; for example, the squared slabs (F. 19) at the western end of the structure (**Fig. 5**), which are pedestalled above the surface. Numerous stone features, isolated rocks, and large and small artefacts lay strewn across the surface of Locus 8.3. In the western corner of the plot, near the intersection of Wall 9 and the south baulk, a stone cluster (F. 30) formed a third, successive version of those below Features 18 and 21 of Upper and Lower Phase 3 respectively. Towards the eastern end of Locus 8.3, several large stones (F. 36 a-c) lay intermingled with an assortment of artefacts and debris. These objects included a massive basaltic pestle (RN 160291), broken basaltic and limestone artefact pieces, chunks of both red and white ochre, and five Dentalium fragments.



5. Surface of Phase 4; view west.

Beneath the Phase 4 surface (Locus 8.3), a number of pits and stone features were dug into the natural travertine deposits (**Figs. 6, 7**). These are primarily clustered underneath the later Structure 3, and three of them contain human skeletal remains. The most important find in this regard was a burial (Feature 29) containing two primary child inhumations: *Homo 9*, found overlying Homo *10* (Bocquentin, below); numbering of the human remains commences at '9' because eight sets of human skeletal remains were unearthed in the 1980s excavations. Human remains were also discovered in two other pits, but time did not permit their excavation. The first was a human vertebra in Feature 32. This pit also yielded an unusual concentration of long gracile bone points (Edwards, below) of a type not previously found at Wādī Ḥammeh 27. Additionally, a human maxilla was found on the north-eastern slope of the large, partly stone-paved pit, Feature 35. Feature 34 (**Fig. 8**), the deepest stone-lined posthole as yet discovered at Wadi Ḥammeh 27, lay under the later stone-lined posthole (F. 22) in Phase 3.

There were other significant features located in the area outside Structure 3 (to its north). Excavation of the stone platform



6. Overhead view of the base of Phase 4 in Plot XX F; end of 2016 excavations.

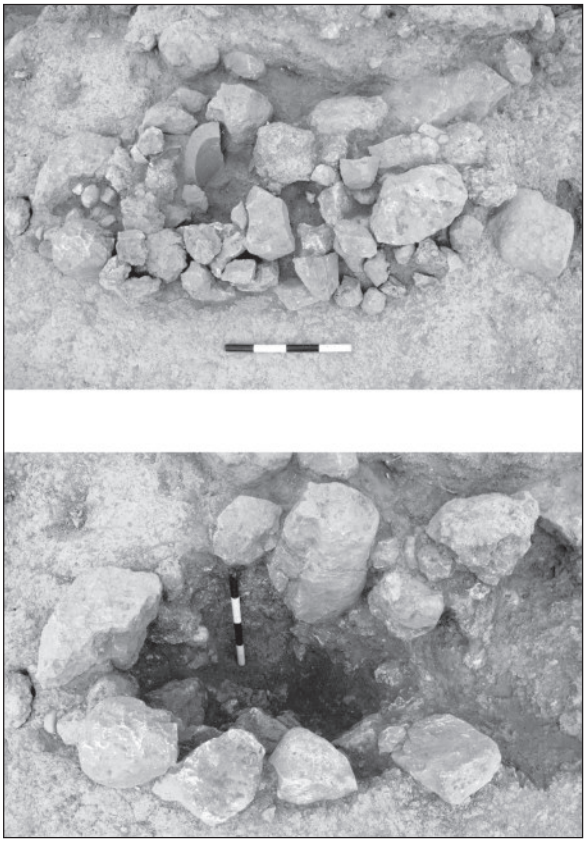
(Feature 20) revealed it as a deep, stone-lined pit (**Fig. 9**) with a significant component of burnt sediment, reminiscent of the Feature 16 pit that accompanied the neighbouring F. 8 burial (**Fig. 7**) in the XX F Sondage (Webb and Edwards 2013). Similarly, Feature 20 may have been placed in order to mark the graves to its south (Features 29 and 32). Versions of this construction were built through all later phases of the settlement, over a period of some 500 years. By the end of the excavation period on 12 December 2016, Phase 4 was cleared to the basal travertine rock layer across the entire excavated area, except for the two incompletely cleared pits (F. 32 and F. 35).
(P.C.E.)

The Double Primary Grave (Feature 29, Phase 4)

Excavation of the Feature 29 double grave, (Locus 8.5, Squares E/F-2/3) was undertaken according to the protocol defined by the archaeothanatological approach. This method,

7. View west to Phase 4 pits.

8. The deep, stone-lined posthole (F. 34); view north.



9. Feature 20, Phase 4; before (top) and after excavation (below).

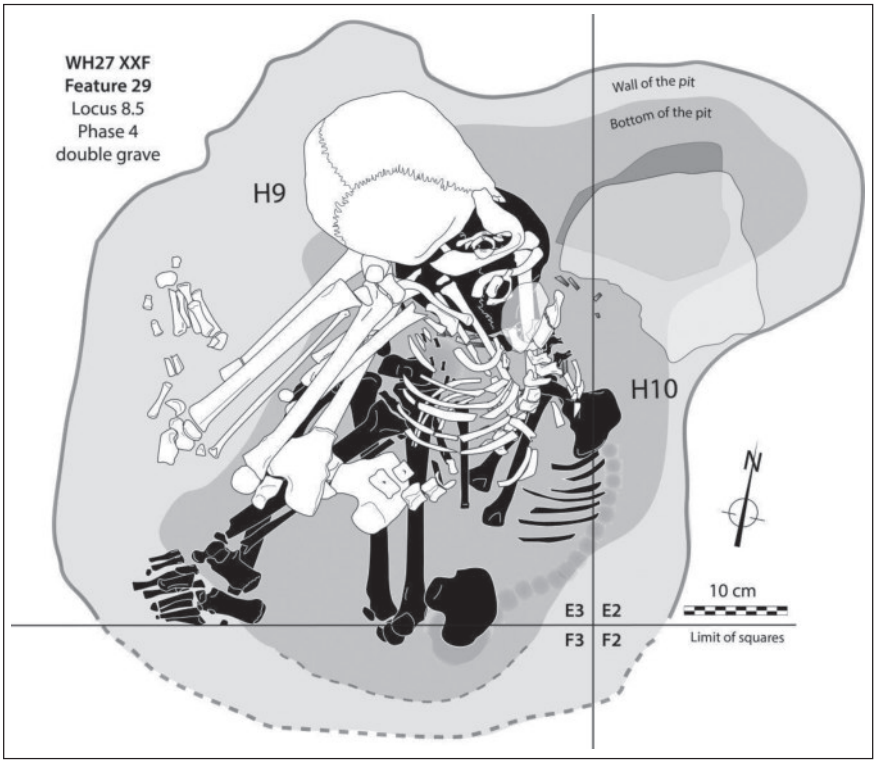
first named 'field anthropology' and recently renamed (e.g. Duday 2009), aims to precisely record the location and interrelation of items (human bones and other objects) present in a grave. Items are individually numbered and mapped, and anatomical aspects and the degree of connection or dislocation of bone joints are recorded. In comparison with their expected anatomical relations, the potential movements of the joints, from the moment of burial to the point of excavation, can yield crucial data for reconstructing handling of the corpse during deposition, the funerary process, and post-depositional events (whether deliberate or accidental). This kind of dynamic reading of the grave is directly inherited from a wider general attitude in archaeology that considers spatial evidence as an important clue to understanding the function and meaning of items and structures, through the reconstruction of micro-historical events (e.g. Leroi-Gourhan 1972).

Two children were deposited on top of each other in the small burial pit (F. 29) cut into the travertine from Locus 8.3. The bottom of the pit is narrow, and deepens towards the south-west; the bodies were partly resting against its irregularly carved walls. Both *Homo 9* and *Homo 10* were placed in a contracted position and oriented south-west to north-east, with skulls towards the north-east (**Fig. 10**).

Homo 10, a child of 8-11 years age-at-death[2], was first placed in the grave on its right side, with the lower and upper limbs flexed (**Fig. 11**). Its feet were crossed (the left ankle superimposed on the right one) and its hands were placed under the knees, on top of each other. The left fist was clenched while the right hand was open. The head and neck were initially in an upright position, resting on a slab. The position of the skull and the first cervical vertebra at the time of excavation, dislocated from the rest of the vertebral column, show that they collapsed against the bottom of the pit during the decay process. This collapse, together with other major joint dislocations (hips, knees, elbows) due to gravitational forces, points towards a delayed filling of the pit. The child must have been placed in a supple container, made of leather or vegetal fibres, which prevented the immediate infilling of sediment following decomposition of the soft tissues. This conclusion is corroborated by the fact that, at the periphery of the corpse, bones of the thorax and of the pelvis were maintained in an upright position (whereas collapse would normally be expected). The container wall, which must have been positioned at the pit margin, thus formed a barrier to bone element dispersal. Many poorly preserved Dentalium fragments were found in the area of the neck and upper thorax; a few were found in pairs, parallel to each other. These items were likely part of a short necklace of two rows of beads, scattered downslope to the south following the decay process. Eighteen pieces were removed, but remnants of others were observed as well, indicating the initial presence of a more elaborate piece of jewellery.

The deposition of the second child, *Homo 9*, was preceded by a further partial filling of the burial pit. Indeed, *Homo 9* did not rest directly on the container of *Homo 10*. Rather, about

2. Age estimation is based on dental calcification (Moorrees *et al.* 1963).



10. The double burial, Feature 29 (Locus 8.4), containing two children; (Homo 9 placed over Homo 10).

10 centimetres of sediment separated the two cadavers, except for the cephalic areas, which were in direct contact with each other. *Homo 9* is a younger child, *c.* 5-7 years age-at-death. Like *Homo 10*, it was also resting on its right side, but with the upper part of its chest lying in a ventral position, and its lower limbs more tightly flexed (**Fig. 12**). Its hands were placed together under its heart, and rested directly on the head of *Homo 10* (**Fig. 13**). Again, as with *Homo 10*, its head was initially placed against the western edge of the worked slab placed next to it (and directly on the slab dedicated to *Homo 10*). However, the skull of *Homo 9* rotated almost 180 to the north-west during the decay process, and appeared in postero-lateral right view during excavation. The first five cervical vertebrae followed the movement of the skull, pointing towards a collapse not long after the decay process started. As with *Homo 10*, taphonomic witnesses of a soft container

11. The primary child inhumation, Homo 10, in Feature 29.

12. The primary child inhumation, Homo 9, in Feature 29.

13. Detail of Homo 9, with its hands placed together under its head and resting on the head of Homo 10.

are clear:

1) delayed infilling is shown by the collapse or sliding of several bones, in addition to the rotation of the skull (left fibula, left calcaneus, left femur, left humerus and right foot).
2) peripheral constraints are evidenced by the unstable vertical position of both feet and the thoracic cage (right scapula vertical and vertebrae over the left ribs).

Several objects were found in the upper fill of the grave. These included a pear-shaped piece of limestone, two fragments of worked basalt, and two Dentalium fragments stained with red pigment. It was not possible to determine conclusively if these objects had been deposited as grave goods for *Homo 9*.

In conclusion, both children were placed in similar positions, one superimposed over the other. The oldest child, buried beneath the younger one, was wearing a Dentalium necklace. Both children were provided with an individual stone headrest and an individual funerary bag. The direct contact of the heads is a strong argument for simultaneous deposit, although a short period of delay while the pit lay open cannot be totally ruled out.

Superimposed burials are not frequent in a Natufian context, but interestingly some cases are documented in other sites and in various phases. One adult male and two young babies occur at Ain Mallaha during the Final Natufian (H. 154, 151, 153; Bocquentin 1998); two young adolescent males in Raqefet Cave during the Late Natufian (H10 and H13; Lengyel *et al.* 2013); two adult males in Hayonim Cave during the Early Natufian (H25 and H27; Belfer-Cohen 1988; Bar-Yosef 1993) and one adult male with a baby in al -Wad Cave during the Early Natufian (H4 and H9; Garrod and Bate 1937; Bocquentin 2003). Except for this last case, dug in the early 1930s and for which documentation is not detailed enough for an archaeothanatological discussion, all superimposed corpses were buried in individual shrouds or containers. Moreover, each time sex determination was possible, only males were involved. Finally, in the case of Hayonim Cave, strong family links were found between the two adult males buried together (Bocquentin 2003: 401). These examples show that superimposed corpses are not just a response to possible simultaneous death, but are specific features following strict rules or taboos, common to all Natufian communities. Other kinds of plural graves do exist with different rules (corpses side to side, mixed sex, no babies).

It will probably be difficult to say more about the biological identities of the two children from Feature 29 at Wādī Ḥammeh 27. Their skeletons were found in a poor state of preservation within a hard, black, organic matrix, mixed with chunks of travertine. As many *in situ* measurements as possible were recorded, and samples of sediment from the region of both pelves and within the crania were taken, in addition to well-contextualized charcoal pieces found in the fill. The hope of gaining more information rests mainly with the samples of molars and petrous bones extracted for isotopic (Shewan, below) and ancient DNA analyses (Valdiosera, below).
(F.B.)

Scattered Human Bones from Phases 2 And 3

During the 2016 season, a review of the faunal bags from the three project seasons (2014, 2015 and 2016) was made in order to look for human bones included in them during sorting. So far, forty human bones or clusters of fragmented human bones have been identified. A concentration was found in Square E6-1 (Locus 2.5 and 2.6, Phase 2), comprising twenty cranial fragments and five other human bone fragments (ribs, phalanges and vertebrae). All except two were burnt (mainly a black-grey colour, indicating a low temperature of burning). They belong to at least one adult and one immature individual. Another concentration of immature burnt cranial fragments was found in Square E2-1 (Locus 6.1, Phase 3). This preliminary inspection corroborates and extends the practice previously described from Phase 1 (Webb and Edwards 2002), where burnt pieces of human crania were scattered in the occupation deposits A comprehensive analysis of these remains will be done when finds sorting is completed.
(F.B and M.A.)

Geoarchaeological Sampling

A second season of geoarchaeological sampling was undertaken at Wādī Ḥammeh 27 during November 2016 for sediment samples, in order to establish the nature, origin and significance of the anthropogenic deposits (Courty *et al.* 1989; Macphail and Cruise 2001), and to evaluate field identifications of trampled floors (Edwards 2013a). The sampling program included the extraction of intact sediment blocks and associated bulk samples for micromorphological investigation (Courty *et al.* 1989; Goldberg and Macphail 2003). These samples will allow the investigation of archaeological questions pertaining to patterns of residence, abandonment and past human activities at the site.

Exposed surfaces were cleaned to remove weathered profiles and stratigraphy was drawn to scale. Sediment blocks measuring approximately 15cm x 10cm x 10cm were cut; blocks were larger than required to ensure intact samples for study (Goldberg and Macphail 2003). Before removal, sample locations were recorded on scaled stratigraphic diagrams. Samples were cut from profiles or pedestalled sediment blocks. Canned samples had been taken in 2015, but it was found that the vibration which ensued from driving cans into the baulk wall resulted in the partial break-up of sediment samples. To get around this problem in 2016, gypsum plaster bandages were applied to support block samples (**Fig. 14**), and to preserve the friable sediments, inclusions and artefacts therein (Goldberg and Macphail 2003). Photographs were taken during the process and before removal. Samples were labelled when the plaster was dry (including their orientation). Associated bulk samples were taken at 5cm intervals down the profile, and recorded on the scaled stratigraphic diagrams.

Both systematic and selective sampling were employed to provide full coverage of lateral and vertical variations in contexts and specific boundaries (Courty *et al.* 1989: 41; Goldberg and Macphail 2003: 573). Blocks sampled from Plot XXF are from sediments identified as occupation Phases 2, 3 and 4. Blocks were taken from the east baulk of the XXF Sondage in Square E1, from pedestalled sediment in Square D3, and from Feature 32 (Square D3), in order to investigate lateral variations in stratigraphy and pit fill. Selective sampling was applied at the East Cliff Exposure (ECE), to focus upon

14. Lauren Prossor taking plaster-jacketed, oriented sediment samples from the eastern baulk wall of Plot XX K.

transitions between sedimentary units. In order to sample Phases 0 and 1 sediments, a 2m x 2m area of backfill was removed from the eastern baulk of Plot XXK (excavated in the 1980s), to enable sampling by a series of systematic, overlapping blocks. A natural analogue for the Wādī Ḥammeh 27 sediments, which would provide a baseline for future analyses (Courty *et al.* 1989; Goldberg and Macphail 2006), was unable to be located for sampling on the plateau, because the site covered the entire landform (i.e. the 'Natufian clay', *cf.* Edwards 2013a).

Block samples will be impregnated with an araldite-based resin for thin section production. Micromorphological descriptive nomenclature by Stoops (2003), and Stoops and colleagues (2010), will be used to describe the thin sections. Thin sections with no cover slip will be produced, so that additional ancillary analyses such as *in situ* SEM-EDX or Fourier transform infrared spectroscopy (FTIR) can be undertaken directly on the thin sections, thereby increasing the accuracy and cross-correlation of microstratigraphic data gathered during analysis (Canti 1995).
(L. P.)

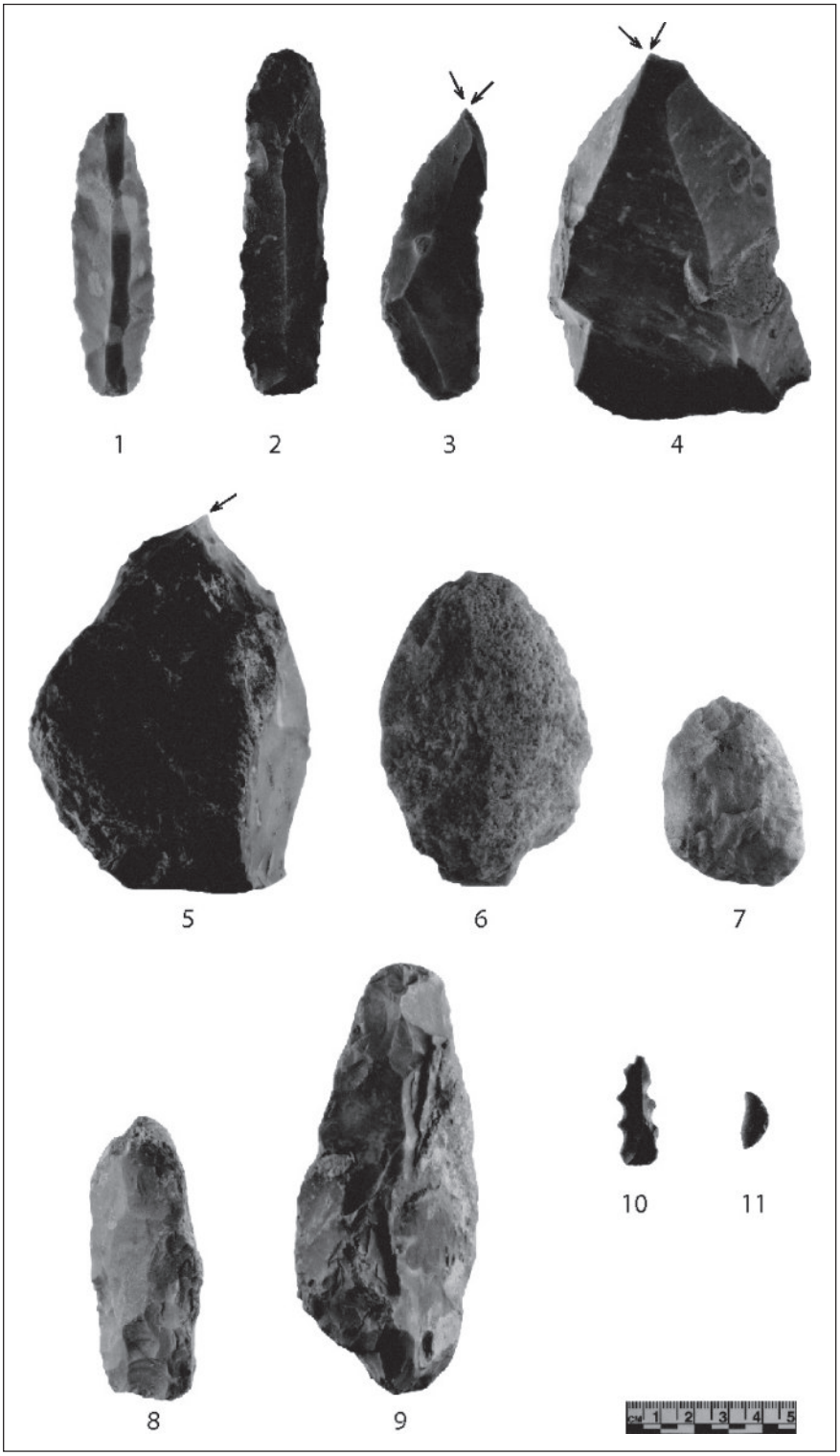
Flaked Stone (Chert) Artefacts

A total of 143,384 flaked stone chert (flint) artefacts were recovered from the lower Phase 3 deposits (*Loci* 8.1, 8.2, 9.1, 9.2 and 9.3), with an average volumetric density of 66,505 artefacts per cubic metre. Phase 4 proved to be similarly rich in lithic material, with 76,626 artefacts recovered from the relevant *loci.* A slight decrease in artefact density was noted, however, with the Phase 4 deposits containing an average of 53,361 artefacts per cubic metre. Artefacts classified as debris ('chips and chunks') numerically dominate every locus, demonstrating that knapping was consistently performed onsite from the earliest occupation of Wādī Ḥammeh 27.

Retouched chert artefacts from the 2016 excavations included characteristic types which have previously been described for other phases of the site, including Helwān-retouched lunates, sickle blades and bladelets, awls, and notched and denticulated bladelets. Significant this year were finds of large flint tools, particularly from the exterior areas north of Structure 3, including rare items such as large cores, massive burins, and trihedral picks (**Fig.15**). Also present were a small but significant number of exceptionally long, thick, retouched blades, which were unlikely to have served as composite sickle elements; their function was much more likely to have been hand-held serrated cutting implements (**Fig. 15:1-2**). Ultimately, however, these artefact types were few in number, and anomalous with respect to the series of smaller retouched bladelet products. Helwan-retouched lunates and bladelets dominate the geometric and non-geometric assemblages respectively. These items were often produced from the type of small core, often rotated, that was quintessentially Natufian from the earliest occupation of the settlement.

Of further note were two small quartzite bifaces (**Fig.15: 6-7**), one of which was recovered from the Lower Phase 3 deposits inside Structure 3, (Locus 8.1) and the other from the Feature 35 burial (Locus 8.9, Phase 4). These two artefacts are notable in that they are the only flaked stone artefacts manufactured from quartzite to feature in the Wādī Ḥammeh 27 assemblage. It is possible that they represent objects produced in the earlier Palaeolithic that were collected as curiosities. However, they do not resemble items found or excavated in Lower or Middle Palaeolithic sites from the region (Macumber and Edwards 1997; Edwards 2004). They may well have been be made *in situ*, given their fresh condition and lack of patina, and the fact that bifacial tools are a regular part of the Natufian assemblage.

While analysis of Phase 3 spatial distribution remains in its preliminary stages, several clear distinctions between lithic artefacts deposited within the interior and exterior loci are apparent. Most notable is that the average mass of artefacts deposited in Locus 9.1 was more than twice that of the internal Locus 8.1 artefacts. This is best represented by the comparative mass of cores and retouched artefacts deposited between the two loci. The interior Locus 8.1 cores comprise eight percent of the total mass of lithic material in this area, with the mean core weighing twenty-three grams. In contrast, Locus 9.1 cores incorporate fifteen percent of the exterior lithic material by weight, with the average core recovered from this area weighing



15. Flaked stone (chert) artefact tools from Plot XX F: 1-2) blade retouched on both edges; 3) dihedral burin/ endscraper; 4) dihedral burin; 5) burin on oblique truncation; 6-7) quartzite bifaces; 8-9) trihedral picks; 10) denticulated bladelet; 11) Helwan lunate. All objects are from Phase 3 except 5 and 6, which are from Phase 4.

forty-nine grams – more than twice that of the interior cores. The retouched artefacts recovered from the two loci demonstrate a similar – if slightly less pronounced - distribution, with a higher number of heavier tools recovered from the external area. This was most noticeably manifested in the fact that the only two trihedral picks to be recovered throughout the last three years of excavations were recovered (in close proximity to one another) from Locus 9.1. Both

loci contained a similar amount of minute lithic debris, suggesting that knapping was performed in both settings. The larger numbers of heavier artefacts deposited outside may nonetheless be indicative of a desire to keep the internal floor of Structure 3 somewhat clear.

The Feature 29 artefact assemblage yielded one of the lowest percentages of tools, with less than one percent of the flaked stone artefacts excavated from its deposits featuring retouch. In contrast, the adjacent Feature 32 fill exhibited the highest proportion of retouched tools seen in the lower deposits of Wadi Ḥammeh 27, suggesting that some of these may have been intentionally deposited alongside the bone tools uncovered from this pit.
(A.M.V)

Basaltic Artefacts

Twenty-nine basaltic artefacts were recovered from the excavations in 2016. The great majority (76%) of pieces were from Phase 4 layers, with five objects (17%) from Phase 3, and two (7%) found during sediment testing on the eastern side of the Plateau. Phase 3 produced a short pestle (RN 160100) of uncommon type and a miniature bowl (RN 160324, **Fig. 16:6**). Two pestle fragments and a handstone fragment complete the repertoire from this phase.

Less than a third of the objects from Phase 4 (28%) were complete. Two pestles were unusual in form; RN 160250 with its twisted, 'banana'-shaped profile (**Fig 16:4**) and the conical example, RN 160252 (see Fig 16:5). Large pestles, missing in Phases 2 and 3, make a return in Phase 4, for example RN 160291, which is 36.0 *cm* long and 10.4 *cm* in diameter (**Fig 16:1**). Another complete object (RN 160391) is a grooved plaque, or shaft straightener/ abrader (**Fig. 16:7**). The most interesting evidence from a technological point of view was the discovery of an apparently unworked lozenge of vesicular basalt raw material (RN 160248) and an apparently incomplete basaltic vessel (RN 160420; **Fig. 17**). These objects are the first signs that basaltic artefacts were made on-site at Wādī Ḥammeh 27, and were not always imported as finished pieces. Large vessels, probably mortars, were found in fragmentary form, with examples found in Feature 20 (RN 160247 and RN 160249).

During sediment sampling, a pair of gracile pestles fell from the East Cliff Exposure, located 18 metres south-east of the main excavation area. The two items were located side by side, similar to Artefact Cluster 2 from Plot XX E in Phase 1 (Edwards and Hardy-Smith 2013: 105). RN 160128 (**Fig. 16: 3**) has bi-convex terminals, whereas RN 160129 has one flat terminal (**Fig. 16: 2**). The additional significance of this find is that it augments the estimate of site area for the site from 2,380 m^2 (Edwards 2013b: 65) to possibly half a hectare. Previous evidence from Plots XX M had indicated a sharp fall-off in occupation intensity, immediately east of the main excavation area.

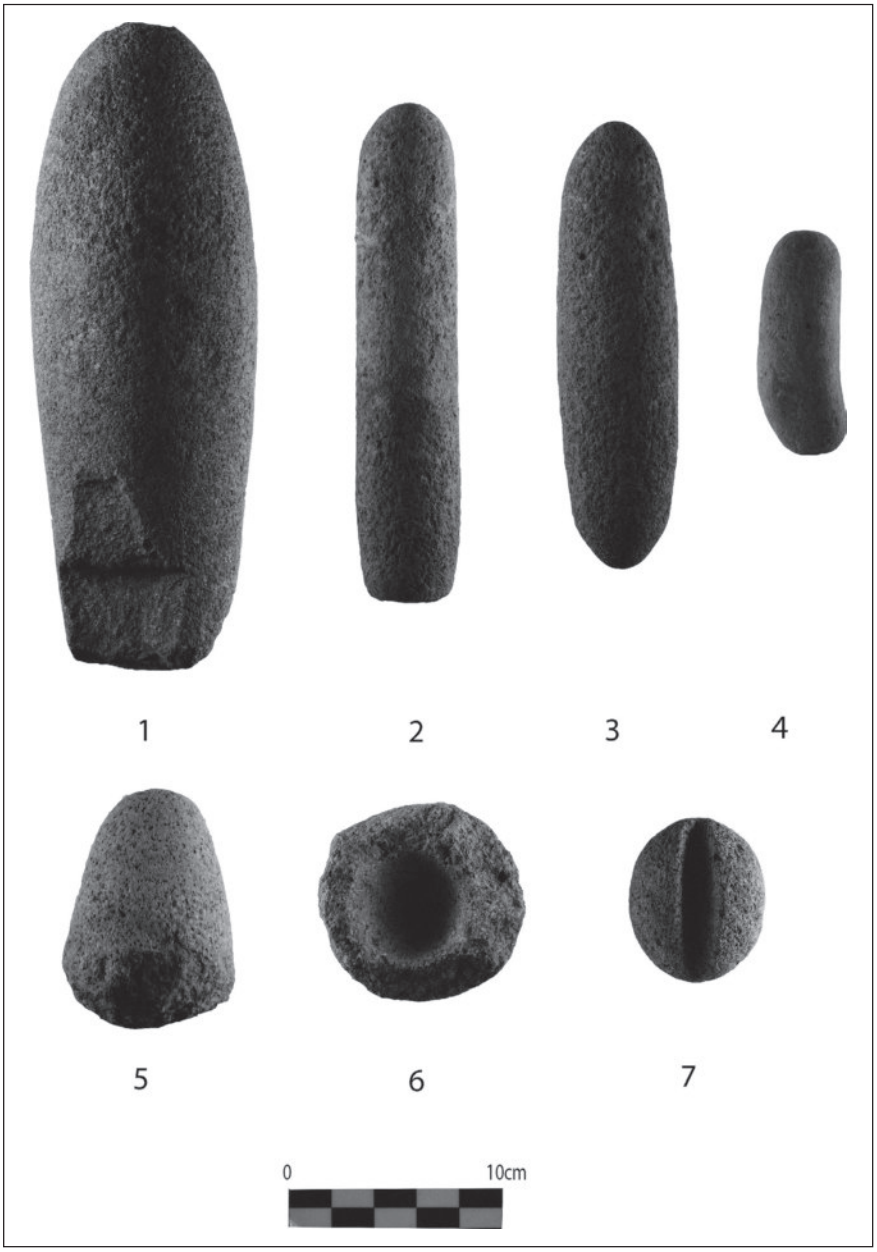
Limestone Artefacts

Of the twenty-two limestone artefacts, eight were recovered from Phase 3 deposits (36%) and thirteen (59%) from Phase 4 layers, with a plaque (5%) bearing an incised pattern found on the surface (RN 160431). The incised plaque (**Fig. 18**) features a series of parallel lines opposed to a series of vertical strokes, and in this respect it is reminiscent of a similar example from the nearby, small Natufian site of Wādī Khawwan 1 (Edwards *et al.* 1998). Complete objects from Phase 3 are comprised of a handstone, a small spheroid and a worked pebble. The fragmentary items include vessels, a handstone and a hammerstone.

Phase 4 produced more complete (8) limestone artefacts than broken ones (5), which is unusual, as fragmentary objects are usually numerically ascendant for most classes of artefacts. This is probably because complete limestone objects are quite robust, and this is certainly the case for a bulky quern (RN 160429), which is a rare item at Wādī Ḥammeh 27. Another limestone vessel (RN 160429), which was probably utilised as a mortar, had a breeched base (**Fig. 19**). Other artefacts included hammerstones, shaped plaques and pieces, and a pestle. The fragmentary artefacts are represented by a similar range of types, with the addition of a broken miniature plate, (RN 160275).

Bone Artefacts

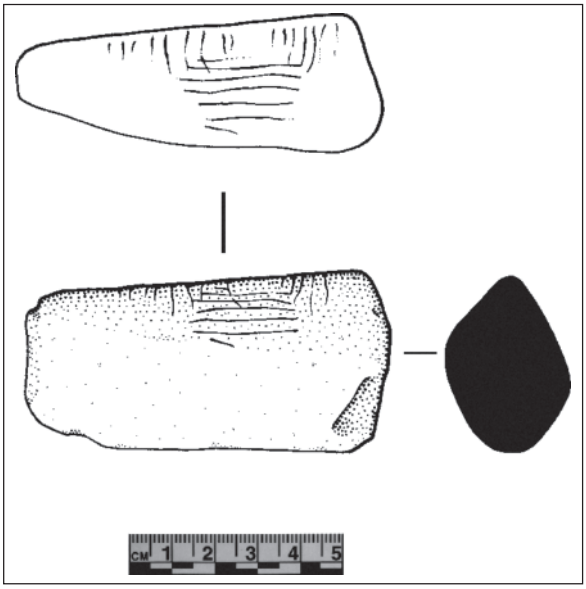
The 2016 excavations yielded some interesting new types of artefacts, as well as artefactual evidence that challenges previous interpreta-



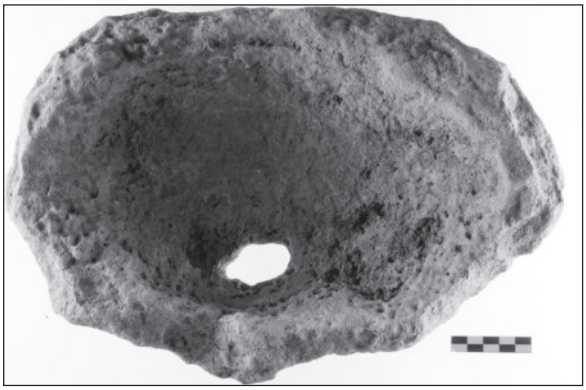
16. Basaltic artefacts: 1) massive pestle, RN 160291; 2) pestle with flat terminals, RN 160129; 3) pestle with convex terminals, RN 160128); 4) pestle with twisted profile, RN 160250; 5) conical pestle, RN 160252; 6) Grooved plaque (RN 160391; 7); miniature bowl, RN 160324. Various phases and excavation localities.

17. Unfinished basaltic artefact (RN 160420); Phase 3.

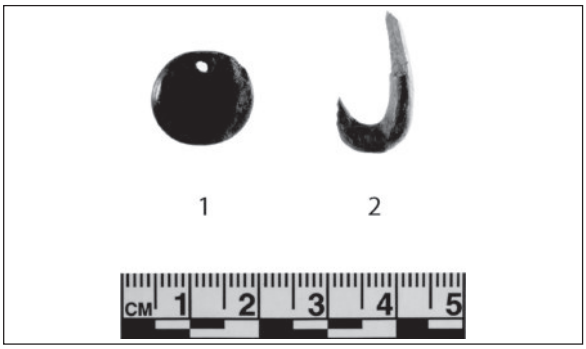
tions of the site. Of forty-three objects, nearly all were fragmentary. Phase 3 yielded twenty-six items, almost all of which were broken, while seventeen objects were recovered from Phase 4. The assemblage included numerous non-diagnostic fragments, a few points, and a gazelle podial bead. A notable find is a bone fishhook (RN 160278; **Fig 20:2**). The fish-hook is a reasonably common type in more westerly Natufian sites, but the example discovered in 2016 is the first one from Wādī Ḥammeh 27, from a bone artefact assemblage numbering over 550 specimens (Edwards and Le Dosse-



18. Limestone plaque with incised design of lines and strokes (RN 160431); surface find.



19. Breeched limestone vessel (RN 160429) from Phase 4.



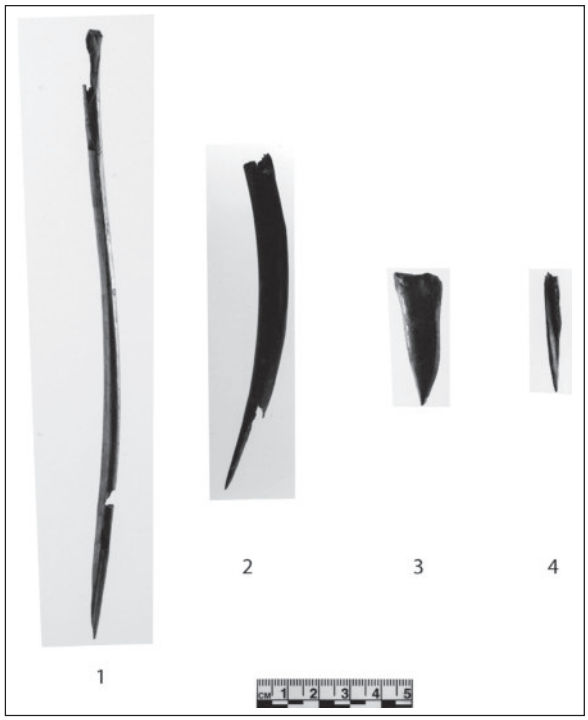
20. 1) Bone pendant, RN 160211; and 2) bone fish-hook, RN 160278; both from Phase 4.

ur 2013), and where fish remains do not occur (Edwards and Martin 2013).

The other noteworthy items from Phase 4 are a cluster of four unusual bone points, deliberately placed in the (incompletely excavated) burial pit, Feature 32. The most remarkable specimen is a very long, gracile point (RN 160365), measuring 19.5 centimetres in length, but only a few millimetres in width at any point (**Fig. 21:** 1). RN 160364 is a similar example, with a length of 15 *cm*. This piece had been fragmented into many pieces *in situ,* and could not be effectively mended. RN 160360 (**Fig. 21: 2**) is a long curved point, possibly made from a rib. All three of these objects are unique in the Wādī Ḥammeh 27 repertoire. Elsewhere, Phase 4 yielded a robust point (RN 160396) made from the proximal epiphyseal region of a mammal bone (**Fig. 21: 3**). The example from Phase 3 (RN 163063) is a finer, more conventional piece for the site (**Fig. 21: 4**). Another new artefact type from Phase 4 is a small, circular bone pendant (RN 160211; **Fig. 20:1**). Its closest parallel at Wādī Ḥammeh 27 is an ovoid specimen (RN 150007), excavated in 2015 from Upper Phase 3.

Pigmented Earth (Ochre)

Small flecks to large chunks of red and yellow ochre have been found in every phase and major context in Wādī Ḥammeh 27. These finds continued in 2016, together with examples of a distinctive, white pigmented earth. Forty



21. Bone points: 1) RN 160365; 2) RN 160360 from the Feature 32 burial pit; 3) RN 160396, Phase 4; 4) RN 163063, Phase 3.

percent of the ten recorded ochre pieces in Phase 3 were white, rising to 73% in Phase 4 (11 cases). Two large examples from Phase 4 were worked into squarish blocks.

Manuports and Miscellanea

Highly polished, siliceous stones have occasionally been found throughout the Wādī Ḥammeh 27 sediments (Edwards *et al.* 2013). The 2016 excavations produced relatively more than any other season, with four shiny pebbles from Phase 3 and two from Phase 4. The previously substantial numbers of marine Dentalium shell fragments were greatly augmented in 2016; not only from the current 2016 excavations, but also from finds found by wet-sieving bags from 2015. In all, 436 examples were registered. Three fossils were also discovered in Phase 3; a bivalve, a cephalopod specimen (cf. *Baculites sp.),* and a distinctive echinoid which is treated in more detail in the following section.
(P.C.E.)

Fossil Echinoid

The single, globular fossil echinoid or sea urchin (RN 160138), measuring 30mm in diameter (**Fig. 22**), found on an exterior Phase 3 (lower) surface, represents the first example of this type of fossil to be recovered from Wādī Ḥammeh 27. It is relatively worn, the wear seeming to be of natural origin. Like all echinoids, the animal's test (shell) is composed of five double columns of large plates (the interambulacra), alternating with five columns of small plates which are pierced by a pair of pores (the ambulacra). The abrasion suffered by the fossil has resulted in many of the surface features of the plates, especially the tubercles that in life bore spines, having been worn away, although a few residual tubercles occur on some ambulacral plates. As a consequence, determining the genus and species to which this fossil belongs is problematic. Alternatively, the weathering has made the specimen more striking in appearance, by highlighting the sutures between the plates. This may have been one of the reasons why it attracted the interest of an occupant of Wādī Ḥammeh 27.

22. Fossil echinoid (sea urchin) RN 160138, cf. genus Leioechinus; from Phase 3.

The echinoid is likely to be a stomechinid example, possibly belonging to the genus *Leioechinus*, which has been described from the Middle Jurassic of Saudi Arabia. This family has not previously been recorded in an archaeological context. It was widespread and existent from the Jurassic to the Cretaceous. Given that other fossils found at Wādī Ḥammeh 27 appear to have derived from local late Cretaceous sediments, it is possible that this echinoid also derived from these rocks.

Fossil echinoids have been reported from a number of Neolithic and Iron Age archaeological sites in Jordan (Reese *et al.* 2002; McNamara 2004). The earliest record to date is of worked fossil echinoids from 'Ain-Ghazal, dated between 9,500 years and 10,300 years BP. Wādī Ḥammeh 27, at 12,000-12,500 BP therefore represents the earliest known record of people collecting a fossil echinoid in Jordan and, indeed, in the Middle East.
(K.J. McN.)

Sampling for A Map of Bioavailable Strontium

The collection of soil and grass / plant samples continued during the 2016 field season, in order to extend the baseline reference map of modern bio-available strontium (Sr) isotope ratios. Sampling was conducted east of the Jordan Valley; firstly at Wādī al-Ḥammeh,

(including samples from Phases 2, 3 and 4 of Wadi Ḥammeh 27), at Tabaqat Fahl (Pella), and higher up–slope at Ashrafiyya and Barqash. Further south, sampling was conducted at Halawa, on the lower slopes above the Jordan Valley, at and near Ajlun Forest Reserve, at ʻAnjara south of Ajlun and Sakhra north-east of ʻAjlun, and at Dibbeen Forest Reserve south of Jarash. Further away to the north-east, samples were also taken from Turra (near Ramtha). The survey and sampling exercise resulted in twenty-five new samples from eleven locations.

Following compulsory Australian quarantine treatment, the samples were prepared for Thermal Ionisation Mass Spectrometry (TIMS) at the Research School of Earth Sciences, Australian National University, Canberra, according to the methodology previously outlined in Edwards and colleagues (2015).
(L.S.)

Archaeogenetic Studies

Ancient DNA or archaeogenetic studies are increasingly indicating their potential to shed light on our understanding of human prehistory, in particular the origins and legacy of agriculture (Günther 2015; Skoglund 2014). Therefore, a sampling campaign for ancient DNA analyses commenced as part of the 2016 field season. In order to conduct this type of research, it is necessary to obtain samples of human remains from stored collections and/or directly from archaeological sites (*in situ*). This is done following stringent protocols for ancient DNA analysis, by collecting the material under sterile conditions, in an attempt to reduce the risk of contamination from exogenous DNA.

The 2016 campaign involved collection of samples of human bones and teeth from the newly excavated Natufian human remains at Wādī Ḥammeh 27, and also a series of human remains stored at the Pella dighouse. The latter specimens derive from a variety of time periods and were accumulated over many seasons of excavation by the University of Sydney at Khirbat Fahl and associated surrounding sites. The Pella samples cover long time-spans, ranging from the Middle Bronze Age to the Umayyad caliphate, but consist in the main of Roman to Byzantine remains.

The human remains collected from previous Pella field seasons potentially correspond to twenty-five individuals. In addition, remains from three individuals were collected from Wādī Ḥammeh 27. Samples were collected from *Homo 9* and *Homo 10*, the two occupants of Feature 29 (Phase 4). Another human bone was sampled from a Phase 3 context excavated in 2015. Altogether, sixteen petrous bones, eleven teeth and up to eight other bone elements such as rib fragments and phalanges were collected.

The samples will be analysed at a specialised ancient DNA facility. Provided these samples yield preserved DNA, the Wādī al-Ḥammeh and Pella regions should be part of the key to understanding the origins and legacy of agriculture in the Southern Levant, and population dynamics of the area over time. Moroever, genetic analyses on human remains from the Natufian complex will enable us to understand the social and biological relationships among early sedentising peoples.
(C.V)

Conclusions

The 2016 La Trobe university season was concluded successfully, with the main research aim of locating human burials at the base of the site attained. More generally, the lower deposits of the site have revealed a great deal about the foundation and architectural evolution of Early Natufian settlements. Several new artefact types were also discovered. With these findings, fieldwork for the three-year La Trobe University project ‘Ice Age Villagers of the Levant’ was completed. The La Trobe University team is grateful to Dr Munther Jamhawi, departmental representatives Musa Malkawi and Muhammad Shalabi, the staff of the Department of Antiquities of Jordan, our local Jordanian staff, and the community of Tabaqat Fahl, for their strong support in the investigation of an important period of Jordanian heritage, which is also of global importance.
(P.C.E)

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