

PRELIMINARY REPORT ON LA TROBE UNIVERSITY EXCAVATIONS AT THE NATUFIAN SITE OF WĀDĪ AL HIMMAH 27, JORDAN IN 2022

*Phillip C. Edwards, Brian Armstrong, Fanny Bocquentin, Isabella Capezio, Patrick Faulkner,
Sarah Gyngell, Aleksandra Michalewicz, Wendy J. Reade, Sereen Al Shobaki and Ahmad Thaher*

Introduction

This report describes the principal results of La Trobe University's excavations in 2022 at the Natufian site of Wādī Al Himmah 27 in Jordan¹. The main efforts during the season were directed at exploring a large multiple human burial in Lower Phase 4, at the base of the settlement. To provide context for the operations described here, a brief summary of prior excavations is first offered.

Wādī Al Himmah 27 (12,000-12,500BC) is represented solely by Early Natufian deposits, which are accessible directly below the surface (Edwards 2013a). With four, well-preserved architectural phases (Phases 1, 2, 3 and 4 - going from latest to earliest, Edwards 2013a;

Edwards 2022), the site offers a finely divided archaeological sequence for the period. Phases 3 and 4 are each divided into distinguishable sub-phases. Overall, the sequence consists of six time-slices, accumulated over some 500 years. The first series of excavations (1983-90) at the site concentrated on broad clearance of the uppermost architectural Phase 1, with a small sondage reaching the base of the settlement in Plot XX F (Edwards 2013a). Subsequent excavations at Wādī Al Himmah 27, effected from 2014 to 2016, concentrated on expanding clearance of the lower phases of Structure 1 in Plot XX F (Edwards *et al.* 2018a; 2018b; 2018c). In the 2014 - 2016 seasons, the underlying architectural Phases 2 and 3 were

1. Wādī Al Himmah 27 is located in Wādī Al Himmah, some 2km north of Pella, in the northern Jordan Valley (Al Aghwar Ash SHamāliyyah), in the Irbid Governate. The 2022 fieldwork season at Wādī Al Himmah 27 was undertaken as part of the 'Earliest Village People: the shift to sedentary life in the Natufian period' project, funded by a three-year, Australian Research Council (ARC) Discovery Project grant (DP210102250). 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 His Excellency, Professor, Fadi Bala'awi, and the staff of the Department of Antiquities of Jordan, under Excavation Permit 2022/69. The excavation season commenced on 10th November 2022 under Department of Antiquities of Jordan Permit No. 2022/69 and was completed on 15th December 2022. Department of Antiquities' representatives on the project were Yusuf Abu Ali, Adnan Negrish and Muhammad Dalgaboni. Jordanian house staff at Tabqat Fahḷ comprised Ahmad Thaher (project manager), Khalid Jawahiri (*chef*), Nawal Tawfiq (laundry), Salim Hmīd (house guard) and finds processors Nasr Hassan and Khalal Khashashneh. Local field excavation staff included Abdullah Ibrahim, Ibrahim Tawfiq Maadi, Khalal Khashashneh,

Saddam Khashashneh, Walīd Khashashneh, and Nasr Hassan. Tayil Ayad acted as site guard. Excavation work and analysis at Wādī Al Himmah 27 was directed by Phillip Edwards and undertaken by Dr Fanny Bocquentin (French National Centre for Scientific Research [CNRS], UMR 8068, Technologie et Ethnologie des Mondes Préhistorique, MSH Mondes Nanterre, France), who supervised the excavation and analysis of human skeletal remains. The field team also included Dr Brian Armstrong (surveyor, photogrammetry, 3D-modelling, University of Melbourne); Sarah Gyngell (excavation supervisor, photogrammetry, 3D-modelling, La Trobe University); Dr Aleks Michalewicz (excavation supervisor, University of Melbourne); Dr Wendy J. Reade (in-field conservation, International Conservation Services, Sydney); and Ahmad Thaher (excavation supervisor and project manager, Amman). Sereen Al Shobaki (University of Jordan) undertook drawing and Isabella Capezio (RMIT University, Melbourne) was the project photographer and video editor. Wendy Reade also conducted laboratory conservation and Dr Patrick Faulkner, University of Sydney, and project co-chief investigator) commenced an analysis of molluscs utilised at Wādī Al Himmah 27. Thanks are due to Dr Stephen Bourke for arranging the use of the Pella dighouse.

excavated, and the basal (Lower) Phase 4 was reached.

A number of human burials, pits and stone features were dug into the natural travertine deposits (**Fig. 1**) at the base of the site in Lower Phase 4 (Edwards *et al.* 2018a, 2018b, 2018c; Edwards 2022). By the end of the 2016 excavation period, Lower Phase 4 had been cleared to the basal travertine rock layer across the entire excavated area of Plot XX F, except for two incompletely cleared pits (Feature 32 [F. 32] and Feature [F. 35]). It was still unclear at the end of the 2016 excavation season whether the western and northern perimeters of Feature 32 had been reached, and the same uncertainty remained over the eastern boundary of Feature 35 (**Fig. 1**). Clarification of the nature of these two pits, and their possible contents, constituted the key aim of the 2022 season. It transpired that both features formed parts of a larger pit, Feature 37.

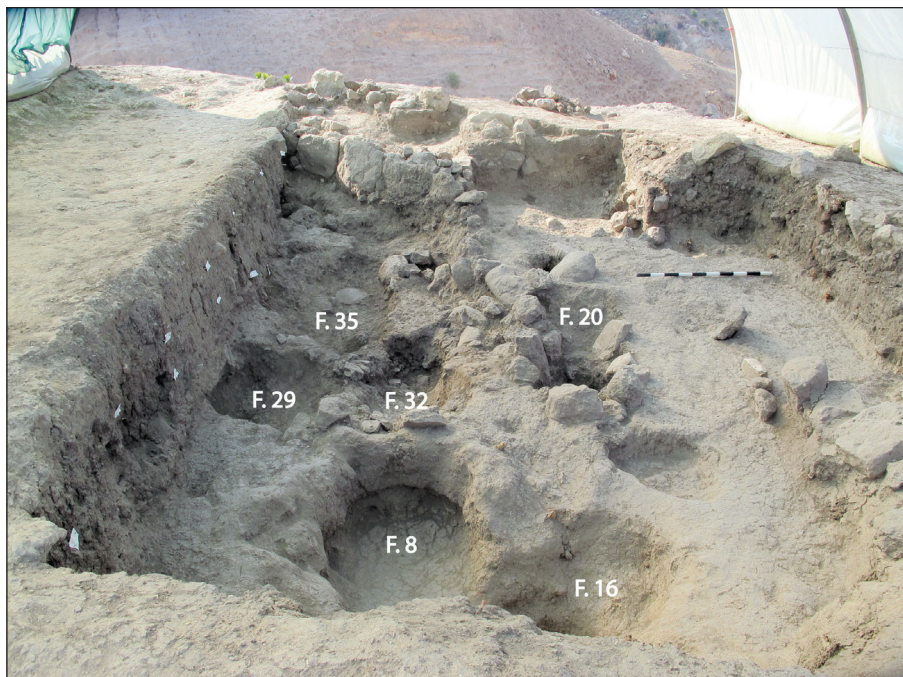
Disposition of Burials in Plot XX F, Lower Phase 4

The burials of Lower Phase 4 are clustered underneath Structure 3, a house built in the overlying Phase 3 (Edwards *et al.* 2018c). The exception is Feature 8, excavated in the 1980s, which lay outside the eastern wall of the later Structure 3 (**Fig. 1**). The pit contained a single flexed burial, *Homo 1*, anchored by a

large rock laid on its thorax. Under the later Structure 3, Feature 29 contained two primary child inhumations, with *Homo 9* overlying *Homo 10* (Bocquentin in Edwards *et al.* 2018a). Human skeletal remains were also reached in the nearby Features 32 and 35 towards the end of the 2016 season, but time limitations did not permit their complete excavation. A vertebra was encountered in Feature 32 and the pit also yielded a cluster of gracile bone points (Edwards 2018a). To the west of Feature 32, a human maxilla was found on the north-eastern slope of the pit, Feature 35. At the conclusion of the 2016 season, Features 32 and 35 were the only two archaeological deposits awaiting excavation in Plot XX F.

Excavation Methods and Artefact Processing

Operations in the 2022 season proceeded according to the same methods that have been used in previous seasons (Edwards 2013b), with some additions. Initially, backfill from Plot XX F was removed and a shadehouse erected over the project area. Excavation proceeded according to natural stratigraphy, supplemented by a square-metre grid. Sediment was dry-sieved through 1-millimetre mesh and residues were turned to the Pella is dig house, wet-sieved in a 1-millimetre mesh and dried on mats before processing by a team of local workers and foreign academic staff.



1. View west over Plot XX F, Wādī Al Himmah 27 before excavation in 2022, indicating burial pit features (F. 8, F. 29, F. 32 and F. 35), and marker pits (F. 16. and F.20).

Site surveying was conducted in 2022. At this point, control points from previous seasons were employed to re-establish the site grid. All surveying work was conducted using a Leica TS-12 total station theodolite. The total station was used to record three-dimensional (3D) locations of significant artefacts and to, record stratigraphic changes and absolute elevations of each phase. In addition, a program of photogrammetric recording was established. All archaeological contexts were recorded with digital single lens reflex (DSLR) cameras, a series of overlapping photos being taken in sequence and then processed using Agisoft Metashape (Version 1.8). When combined with total station georectification, a series of highly accurate 3D models, overhead plans, orthomosaics, and digital elevation models of each phase were produced. This provides a significant resource for site visualization and ongoing archaeological and spatial analysis.

Human skeletal remains were excavated carefully and fully exposed in order to ascertain their distribution and their relationships with accompanying items. The uppermost bones were successively removed after each one was labelled with a reference number, and its location was electronically recorded. Anatomical identification, orientation, direction and dip were recorded for each bone, as was information on the state of articulation of the joints. Despite their apparent good condition during excavation, the larger remains were found to be damp, fragile and easily broken, and composed of very crumbly cortical bone. In order to preserve them, the large bones were protected from breakage at removal by consolidation *in situ*, followed by transport to the conservation laboratory.

Two consolidant solutions were tested in the field. As the soil was carefully removed from the bones with small hand tools, soft bristle brushes, or an air puffer, a 5% volume/volume solution of either neutral pH PVA in water, or 5% w/v Paraloid B72 (an acrylic co-polymer) in acetone was applied to the bone surfaces with small, soft-bristle brushes. Despite the dampness of the bones, Paraloid B72 proved the more desirable consolidant due to quick drying time and better penetration of the bones. This method of bone consolidation

during the excavation process greatly improved the preservation of skeletal elements. In the laboratory, unconsolidated bones and bone fragments, and shells were dry brushed and damp swabbed gently to remove adherent dirt. Consolidated bones were carefully swabbed with acetone to remove excess adhesive and adherent dirt. Once a bone was clean, consolidant was reapplied on all surfaces to stabilize and strengthen it prior to adhering breaks during skeletal reconstruction. Broken bones and shells were adhered with a 30% weight/volume solution of 50:50 Paraloid B72: Paraloid B67 in acetone. This mixture produces an adhesive with a higher softening point, or glass transition temperature (TG), than Paraloid B72 alone (TG = 40 degrees Celsius), meaning that the joins are more likely to withstand the high summer temperatures of the region.

The Excavation of Feature 32

Excavation in Feature 32 commenced with the removal of *Locus* 10.1, a dark greyish sediment, some 7 to 10 centimetres deep. Several burnt stone fragments were found near the top of underlying deposit *Locus* 10.2 associated with disarticulated human bones, including a partial mandible (lower jaw), a talus (ankle bone), and other scattered fragments (**Fig. 2**). Further human skeletal fragments were found near the top of *Locus* 12.2, farther west in the pit. These remains attenuated with depth, before further articulated human remains were found at much lower levels. In the north-east corner of F. 32, a pocket of *Locus* 10.2 was cleared to a depth of 24cm, revealing two sets of several articulated ribs in the underlying *Locus* 10.3 (**Fig. 3**). Further lateral excavation would have been required to follow these articulated bones, overpassing the spatial limits of Feature 32 as defined by its upper deposits. It is most likely that these remains are part of another, probably earlier feature, but this will only be determined after clearance of the higher burials and artefacts which are described below. So, investigations were suspended at this locale and attention shifted to removing sediments from Feature 35 before continuing. Excavations also explored the northern margins of the pit (*Loci* 12.1-2) and its south-eastern margins (*Loci* 8 a-b.1). In the latter area, a small, curved stone



2. View south in Feature 32, showing burnt stone fragments in Locus 10.2.



3. Detail of human rib bones, partially exposed in Locus 10.3, Feature 32.

wall had been built to mark the western side of the double interment, Feature 29 (Fig. 4). It had apparently been constructed using small stones embedded in a mortar of crushed travertine, derived from the substrate rock layer beneath the site.

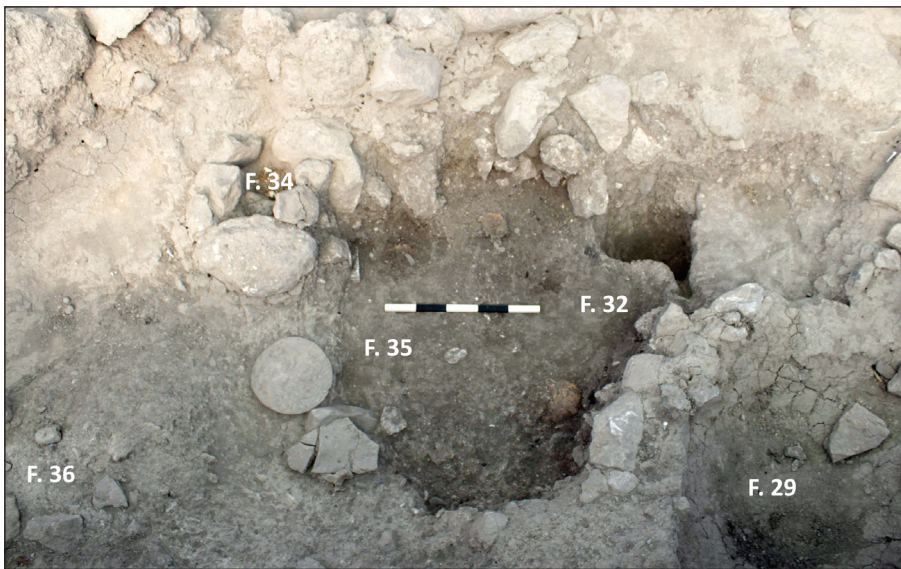
Key Finds from Feature 32

The matrix from Feature 32 included mainly small-scale lithic debris and debitage, a common pattern for the Phase 4 burial pits. Small finds in other materials comprised five bone tool fragments, which included a fragmentary tubular bead, two fragmentary bone points and a complete bone point (Registered Number [RN] 220003, see Fig. 13). These items were

accompanied by five scaphopod, or tusk shell (*Dentalium*), beads, one of which consisted of paired shell fragments. There was also a piece of worked basalt, a small, semiprecious stone, and fragments of ochre.

The Excavation of Feature 35

The sediment in Feature 35 to the west was shallower than that of Feature 32 and less organic in composition. Its excavation involved clearance of a brown sandy deposit (*Locus* 11.1) about 8 centimetres deep, followed by the removal of the 4-centimetre-thick *Locus* 11.2 underlying it; this was a greyer sediment of similar type. The western margin of the Feature 35 pit feathered out at a gentle grade, and was



4. View from the southern baulk of Plot XX F during the excavation of Features 32 and 35 in 2022. The deep context in F. 32, Locus 10.3, is located to the upper right; the discoidal limestone artefact (RN 220070) and the circular stone feature, F. 36, lie to the west margin of F. 35.

notably marked by the placement of a limestone disc (RN 220070), resembling, at first glance, one of the types of limestone plates found at the site (**Fig. 4**). Adjacent to it lay a flat limestone slab, cracked in several places.

Key Finds from Feature 35

When the circular limestone object (RN 220070) was lifted, its underside was revealed as domed and shaped irregularly into a convex mass. RN 220070 may represent a groundstone

plate or bowl abandoned in the initial stages of roughing out, rather like the unfinished basaltic artefact (RN 160420) found in Phase 3 (Edwards *et al.* 2018c: 265). Otherwise, the artefacts from Feature 35 resembled those from Feature 32, though fewer in number. They comprised two fragmentary bone artefacts, the distal end of a bone point, and a tusk shell bead.

Excavations to the West of Feature 35

Further west again of Feature 35, trowelling (in Locus 13.1) revealed an open circle of stones (Feature 36) set into a small mound of calcareous sediment (**Figs. 4-5**). This feature may have been intended as an *aide-mémoire* for the burials or other places of significance in Lower Phase 4. Similar stone cairns, embedded in raised knolls of sediment, were placed in the same place in the overlying Phases 2 and 3 (Edwards *et al.* 2018 a, b, c).



5. Detail of the circular stone feature, F. 36, embedded in calcareous sediment, Locus 13.1.

The Excavation of Feature 37: a Large Multiple Burial

After the conclusion of the 2016 season, it was neither entirely clear that the northern limit of the Feature 32 pit had been reached, nor that the southern margin of Feature 35 had been clearly ascertained. Continuing investigations clarified that F. 32 and F. 35 formed a single larger pit, which was subsequently reassigned as Feature 37. Initial excavations in the pit removed Locus 14.1, a dark-greyish-brown sediment, to a depth of 12 to 14 centimetres which was rich in charcoal fragments.

The deposit's clearance revealed that scattered, well-preserved human bones, including a protruding skull, were distributed across the area (see **Fig. 4**). Excavation of the complex was possible only by staff working in cramped, close quarters (**Fig. 6**); a key to the operation was the liaison between the conservator working beside the excavator, consolidating each fragmentary bone before it was extracted from the hard, dense sediment.

Excavation of the underlying *Locus* 14.2, a similar but somewhat softer dark-brown deposit, established that Feature 37 contained a very dense pile of comingled human remains in a fragile state of preservation. Four human skulls have been exposed so far (including the one protruding in *Locus* 14.1), overlain by a jumble of long bones, ribs, vertebrae, and feet and hand bones (**Fig. 7**). Dig progress was slow, not only because of the overlapping and intricately connected series of bone elements encased in hard, calcareous matrix, but also because of the need to carefully extract numerous bone and shell ornaments, some of which were complete or partially aligned in

primary position, suggesting that they may have been worn by the individuals at death.

Human Remains and key Finds from Feature 37

So far, 255 pieces of human bone have been identified and removed from Feature 37. All categories are present, although cranial elements dominate the assemblage. A preliminary minimal number of 8 individuals (MNI), excavated so far was determined by the maxillae and upper teeth. Among them were remains identified as 4 adults, 1 young adult, 1 adolescent, 1 child and 1 infant. Two right innominate bones measured so far are sexed at 99% probability as belonging to adult males (Bruzek *et al.* 2017). Within the main central pile of bones, no articulated joints have been found so far except a cluster of pathologically fused vertebrae and ribs. However, towards the east of the burial, below the stone-built wall of Feature 29 (see **Fig. 4**), we have started to expose a fully articulated skeleton lying on its right side in flexed position. Its cranium is touching another one from the main scattered pile, certifying a link between those two deposits, although the articulated skeleton is embedded in a different whiter and, harder sediment. The exact sequence of inhumations still needs to be resolved. Currently, whether the scattered bones from F. 37 are the result of a sole secondary deposit of dried remains or the result of successive primary deposits partly or totally dismantled as secondary manipulations is unknown. As a matter of fact, this kind of comingled assemblage is extremely rare in a Natufian context (*e.g.* Bocquentin and Garrard 2016), and our ongoing work augurs well for a highly stimulating study into these extremely complex, multi-sequenced mortuary gestures.

In terms of scattered finds, Feature 37 continued the trend from the upper *loci*, yielding small lithic debitage and debris, a semi-precious stone, fragmentary bone tools, drilled gazelle podial beads and a fragmentary tubular bone bead, and tusk shell beads. The most significant objects from Feature 37 were a range of bodily ornaments, at least some of which to judge from their close association with individual human bones, may have been worn at the time of death (**Fig. 8**). Most of the pieces



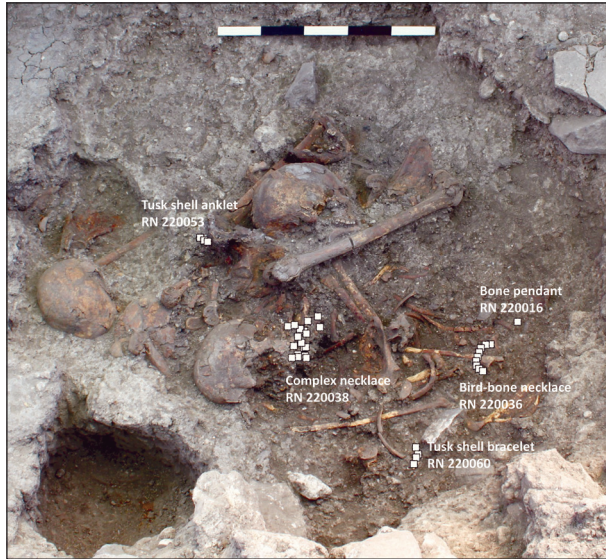
6. Excavation in Feature 37 (from left to right): Isabella Capezio, Sarah Gyngell and Fanny Bocquentin.



7. The multiple burial in F.37 (*Locus* 14.2) including four human crania located in the eastern half of the pit (to the left).

are composite items, but a singular item is an oblong bone pendant of a type not discovered at the site before, fashioned with suspension holes at each end (RN 220016; see **Fig. 14**).

A complex necklace of alternating types of beads was associated with one of the four



8. Location of bodily ornaments in Feature 37.



9. Constituents of necklace, RN 220038, in situ. Circle = tusk shell bead; square = gazelle phalanx; triangle = avian tibiotarsus bead.

complete crania (A086), although the primary or secondary position of the latter is not yet established. The piece included gazelle podial bones, avian tibiotarsal bone fragments, and tusk shell spacers (RN 220038). The constituents of this complex ensemble were found clustered in close association with the maxillary area of the cranium (**Fig. 9**). The kind of gazelle bones were surprising, since they included the sawn-off proximal part of the first phalanx, previously thought to have been a waster, discarded in the production of drilled distal podial beads (Edwards and Le Dosseur 2013: 270ff).

A humerus was found next to an articulated tusk shell bracelet (RN 220053), comprising five rows of beads (**Fig. 10**), still to be completely uncovered and removed. This item, which might have adorned the limb in death, was left unexcavated in 2022. RN 220060 is an articulated Tusk shell bracelet lying between several bones (**Figs. 11, 15**). A necklace of nine beads, fashioned from avian tibiotarsal



10. Articulated tusk shell bracelet (RN 220053), associated with human humerus.



11. Articulated tusk shell bracelet (RN 220060), in situ.

bone fragments (RN 220036), was found in an articulated sequence (see **Figs. 12, 16**), with preserved cordage protruding from one of the beads (**Fig. 17**). This piece is without parallel in the Jordanian archaeological record.

Surface Finds from the 2022 Season

As is often the case at Wādī Al Ḥimmah 27, notable finds were discovered on the surface during the season, having been eroded from the edge of the settlement. They include an unusually small basaltic pestle (RN 220001; **Fig. 18**) and a basalt piece (RN 220002) formed into an ovoid shape (**Fig. 19**).

Analysing the Molluscan Artefacts

As at other Natufian sites, marine molluscs held a fascination for the inhabitants of Wādī Al Ḥimmah 27, and they utilised them through the lifetime of the settlement to make a variety of bodily ornaments. But unlike at other Natufian sites, initial cataloguing through the years has revealed that scaphopods, or tusk shells, were the only varieties of marine shell imported to the settlement. In the 2022 season, a specialist archaeomalacological analysis of the shell artefacts was undertaken for the first time, and it has clarified the nature of molluscan use considerably.

Analysis of the scaphopods was focused on detailed recording of a set of morphological features for taxonomic identification outlined in previous archaeological and malacological research (e.g. Davin 2019; Kurzańska *et al.* 2013; Steiner 1992). All information was recorded in a database following observation and specimen photography using a 10-220x Dino-Lite digital microscope, with measurements obtained by



12. Necklace of articulated avian tibiotarsal bone beads (RN 220036), *in situ*.

Mitutoyo vernier digital callipers or within the DinoCapture 2.0 imaging software. The sample recorded during the 2022 season included 55 specimens recovered from earlier excavations at the site, as well as 58 specimens excavated during 2022 itself. Taxonomic identifications will need to be finalised following comparison with mollusc specimens held within Jordan.

Other marine, freshwater and terrestrial molluscs recovered from the site are also in the process of being taxonomically identified and quantified, again following the established malacological literature for the



13. Bone point (RN 220003) from Feature 32, Locus 12.1.



16. Necklace of avian tibiotarsal bone beads (RN 220036) from Feature 37, Locus 14.2.



17. Detail of cordage protruding from a bead in the necklace, RN 220036.



14. Bone pendant (RN 220016) from Feature 37, Locus 14.2.



15. Tusk shell bracelet (RN 220060) from Feature 37, Locus 14.2.



18. Basaltic pestle (RN 220001); surface find, Wādī Al Ḥimmah 27.

region (Kinzelbach and Roth 1984; Neubert 1998; Neubert *et al.* 2015). Although most of the mollusc samples likely derive from natural processes of deposition on the site, particularly the land snails and the majority of the freshwater gastropods, there were several specimens that indicate transportation, use and some modification of marine and freshwater taxa. Although highly fragmented and small in number, there is now evidence of marine bivalve (families Cardiidae and Arcidae) importation to Wādī Al Himmah 27, as well as the transportation and perforation of two marine gastropods (family Columbellidae and *Trivia* sp.). Interestingly, four freshwater gastropod shells (two *Melanopsis buccinoidea* and two *Theodoxus jordani*) that would have occurred locally also show evidence of having been intentionally perforated as a form of ornamentation.

Conclusions

Feature 37 could not be fully excavated in 2022. At the conclusion of operations, the unexcavated human bones were protected and the site was backfilled. The clearance and inventory of this important deposit now await a future field season. The assemblage of bones must be comprehensively excavated in order to understand the nature of this deposit, its timespan, how many people were gathered together here, their biological and social identity, and how the burial pit was managed over its duration. It will also be important to establish the exact southern limit of Feature 37 and how the skeletal remains found at the deep level in Feature 32 relate stratigraphically to the inhumations in F. 37 and to determine the



19. Ovoid basaltic artefact (RN 22000); surface find, Wādī Al Himmah 27.

exact boundaries between Feature 37 and the twin inhumations in the neighbouring, later pit, Feature 29.

Phillip C. Edwards
Sarah Gyngell
Department of Archaeology & History
La Trobe University
Victoria 3086
Australia

Brian Armstrong
Department of Infrastructure Engineering
University of Melbourne
Victoria 3010
Australia

Fanny Bocquentin
French National Centre for Scientific Research (CNRS)
UMR 8068 Technologie et Ethnologie des Mondes
Préhistoriques (TEMPS)
MSH Mondes, Nanterre
France

Isabella Capezio
Design and Social Context
RMIT University
Melbourne
Victoria 3001
Australia

Patrick Faulkner
Department of Archaeology
School of Humanities, Faculty of Arts and Social Sciences
University of Sydney
New South Wales 2006
Australia

Aleksandra Michalewicz
Melbourne Data Analytics Program
University of Melbourne
Victoria 3010
Australia

Wendy J. Reade
Department of Archaeology
School of Humanities, Faculty of Arts and Social Sciences
University of Sydney
New South Wales 2006
Australia

Screen Al Shobaki
The German Protestant Institute of Archaeology in Amman
Amman 11118
Jordan

Ahmad Thaher
Anthropology Program
University of Tulsa
Oklahoma 74104, USA

Bibliography

- Bocquentin, F. and Garrard, A.
 2016 Natufian Collective Burial Practice And Cranial Pigmentation: A Reconstruction from Azraq 18 (Jordan). *Journal of Archaeological Science: Reports* 10: 693702.
- Brůžek, J.; Santos, F.; Dutailly, B.; Murail, P. and Cunha, E.
 2017 Validation and Reliability of the Sex Estimation of the Human Os Coxae Using Freely Available DSP2 Software for Bioarchaeology and Forensic Anthropology, *American Journal of Physical Anthropology*. 164 / 2: 440-449.
- Davin, L.
 2019 La parure du Natoufien Ancien En Contexte Funéraire: Reconstitution des Chaînes Opératoires à Mallaha (Eynan), Israël. PhD Thesis, Paris 1 Panthéon Sorbonne University. <https://theses.hal.science/tel-02932302/document>.
- Edwards, P.C.
 2013a Stratigraphy, Taphonomy and Chronology. Pp. 33-63 in P.C. Edwards (ed.), *Wadi Hammeh 27: an Early Natufian Settlement at Pella in Jordan*. Brill: Leiden.
 2013b 'Springs, Sweet and Clear': Wadi Hammeh 27 and its Environs. Pp. 1-15 in P.C. Edwards (ed.), *Wadi Hammeh 27: an Early Natufian Settlement at Pella in Jordan*. Brill: Leiden.
 2013c 'Architecture and Settlement Plan. Pp. 65-94 in P.C., Edwards (ed.), *Wadi Hammeh 27: an Early Natufian Settlement at Pella in Jordan*. Brill: Leiden.
 2022 The Origins of a Natufian 'Anomalous Giant': New Evidence from Wādī Hammeh 27. *SHAJ* 14: 39-54.
- Edwards, P.C. and Le Dosseur, G.
 2013 Tools and Ornaments of Bone. Pp. 249-274 in P.C. Edwards (ed.), *Wadi Hammeh 27: an Early Natufian Settlement at Pella in Jordan*. Brill: Leiden.
- Edwards, P.C.; Anton, M.; Bocquentin, F.; McNamara, K.J.; Prossor, L.; Shewan, L.; Valdiosera, C. and Valka, A.M.
 2018a La Trobe University's 2016 Season of Field Sampling and Archaeological Excavation at the Natufian Site of Wadi Hammeh 27. *ADAJ* 59: 273-290.
- Edwards, P.C.; Shewan, L.; Webb, J. and Delage, C.
 2018b La Trobe University's 2015 Geological Survey and Archaeological Excavation Season at the Natufian Site of Wadi Hammeh 27. *ADAJ* 59: 259-271.
- Edwards, P.C.; Shewan, L.; Webb, J.; Delage, C.; Valdiosera, C.; Robertson, R.; Shev, E. and Valka, A.M.
 2018c La Trobe University's 2014 Season of Geological Survey and Archaeological Excavation at the Natufian Site of Wadi Hammeh 27. *ADAJ* 59: 247-258.
- Kinzelbach, R.K. and Roth, G.
 1984 Patterns of Distribution of some Freshwater Molluscs of the Levant Region. *Folia Historico-Naturalia Musei Matraensis* 9: 115-128.
- Kurzawska, A.; Bar-Yosef Mayer, D.E. and Mienis, H.K.
 2013 Scaphopod Shells in the Natufian Culture. Pp. 611-621 in O. Bar-Yosef and F.R. Valla (eds.), *Natufian foragers in the Levant: Terminal Pleistocene Social Changes in Western Asia*. MI., Ann Arbor: International Monographs in Prehistory.
- Neubert, E.
 1998 Annotated Checklist of the Terrestrial and Freshwater Molluscs of the Arabian Peninsula with Descriptions of New Species. *Fauna of Arabia* 17: 333-462.
- Neubert, E.; Zahair, S.A.; Waitzbauer, W. and Talafha, H. Al
 2015 Annotated Checklist of the Terrestrial Gastropods of Jordan. *Archiv für Molluskenkunde International Journal of Malacology* 144: 169-238.
- Steiner, G.
 1992 Phylogeny and Classification of Scaphopoda. *Journal of Molluscan Studies*, 58/4: 385-400.