The Dan David Center for Human Evolution and Biohistory Research

ACTIVITY REPORT 2017 – 2018

Submitted by
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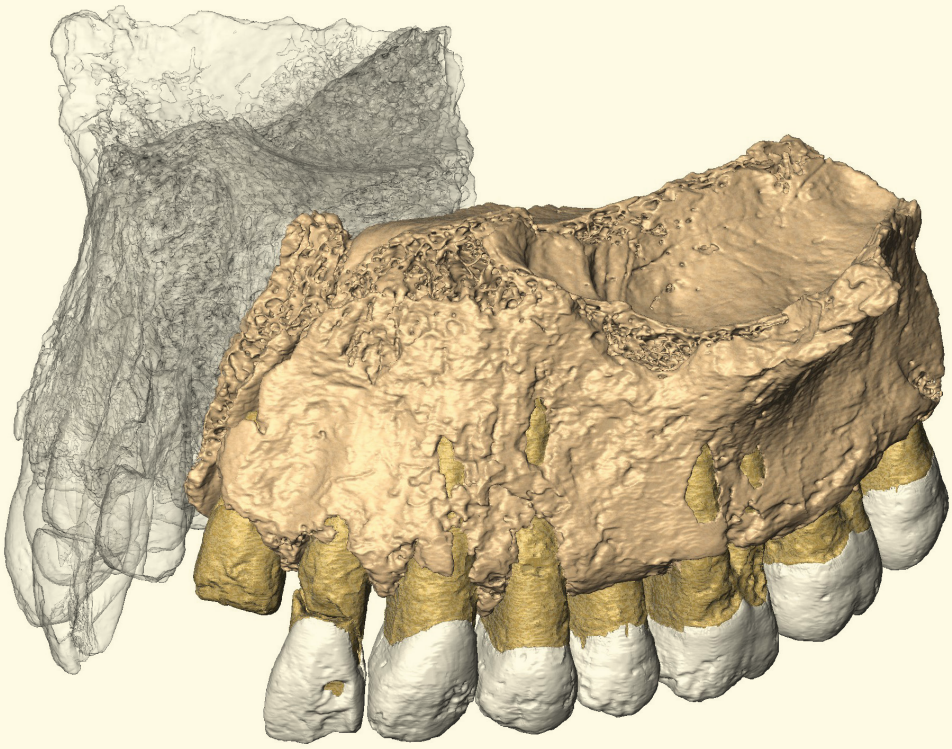

TEL AVIV UNIVERSITY אוניברסיטת תל אביב

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Major Activities

Excavation Reports

MAJOR ACTIVITIES

ACTIVE PARTICIPATION IN SCIENTIFIC MEETINGS

- Bordeaux, France: International Symposium on Dental Morphology
- Bordeaux, France: congress of International Association for Paleodontology
- Vancouver, Canada: Society of American Archaeologists meeting
- Vancouver, Canada: Paleoanthropology Society
- Tel Aviv, Israel: International Association of Dental Research
- Tel Aviv, Israel: Israel Prehistoric Society
- Toulouse, France: Society of African Archaeologists
- Irvine, California: Israeli American Kavli Frontiers of Science Symposium
- York, UK: PALAEO: The Centre of Human Paleoecology and Evolution Origins, University of York

COLLABORATIVE WORKS WITH OTHER INSTITUTIONS

- Harvard Medical School (with Prof. David Reich): aDNA Chalcolithic population of Peki'in.
- Max Planck Institute of Evolutionary Anthropology, (Leipzig, Germany), (with Prof. Svante Paabo): aDNA Middle-Upper Paleolithic population from Manot Cave.
- Max Planck Institute for the Science of Human History, (Jena, Germany), (with Prof Johanes Kraus) – aDNA of Natufian and Neolithic populations from the Levant.
- Max Planck Weizmann Joint Center for Integrative Archaeology and Anthropology, (Leipzig, Germany), (Dr. Kornelius Kupzic) – Dental Dietary Signature in Epi-paleolithic to Modern Societies.
- University of Vienna, Austria; Core Facility for Micro-Computed Tomography, (Prof. Gerhard Weber).
- Binghamton University (SUNY), USA; Department of Anthropology, (Dr. Rolf Quam).
- Case Western Reserve University, Cleveland, USA; Anthropology, Anatomy, and Cognitive Science, (Prof. Bruce Latimer).
- Monash University, Australia; Department of Anatomy and Developmental Biology, (Dr. Luca Fiorenza).
- Max Planck Weizmann Joint Center for Integrative Archaeology and Anthropology, (Leipzig, Germany), (with Dr. Kornelius Kupzic): Dental Dietary Signature in Epi-paleolithic to modern societies.
- The Centre of Human Paleoecology and Evolution Origins, University of York, (with Prof. Paul O'Higgins): The effect of diet on mandibular morphology using finite element analysis.
- Institute of Evolutionary Medicine, University of Zurich, (with Frank Ruhli): The association between the 3D shape of the proximal femur and the risk to manifest hip fracture.

- Max Planck Institute of Evolutionary Anthropology, (Leipzig, Germany), (with Prof. Jean-Jacques Hublin): Changes in 3D shape of the proximal femur during human evolution.
- Center for Functional Anatomy and Evolution, Johns Hopkins School of Medicine, (with Christopher Ruff): Physical burden and lower limb bone structure at the origin of agriculture in the Levant.
- Department of Anthropology, University of Vienna, (with Gerhard Weber): Origin of Modern Human.
- Department of Paleontology, Complutense University of Madrid, (with Juan Luis Arsuaga): Origin of Modern Human.
- Department of Anthropology, University College London, (with Maria Martinon-Torres): Origin of Modern Human.

GRANTS RECEIVED

- Leakey Foundation
- Care Archaeological Foundation
- Binational Science Foundation
- Recanati Medical Research Foundation
- Israel Science Foundation

PUBLICATIONS OF 2017–2018

(Senior Researchers: Hershkovitz, May, Sarig)

1. Hershkovitz, I., Weber, G. W., Quam, R., Duval, M., Grün, R., Kinsley, L., Ayalon, A., Bar-Matthews, M., Valladas, H., & Weinstein-Evron, M. (2018). The Earliest modern humans outside Africa. Science, 359(6374), 456-459.
2. Alex, B., Barzilai, O., Hershkovitz, I., Marder, O., Berna, F., Caracuta, V., Abulafia, T., Davis, L., Goder-Goldberger, M., Lavi, R., Mintz, E., Regev, L., Bar-Yosef Mayer, D., & Boaretto, E. (2017). Radiocarbon chronology of Manot Cave, Israel and Upper Paleolithic dispersals. Science Advances, 3(11), e1701450.
3. Cohen, H., Kugel, C., May, H., Medlej, B., Stein, D., Slon, V., & Hershkovitz, I. (2017). The influence of impact direction and axial loading on the bone fracture pattern. Forensic Science International, 277, 197-206.
4. Cohen, H., Kugel, C., May, H., Medlej, B., Stein, D., Slon, V., & Hershkovitz, I. (2017). The effect of impact tool geometry and soft material covering on long bone fracture patterns in children. International Journal of Legal Medicine, 1-11.
5. Tunis, T. S., Sarig, R., Cohen, H., Medlej, B., Peled, N., & May, H. (2017). Sex estimation using computed tomography of the mandible. International Journal of Legal Medicine, 1-10.
6. Hershkovitz, I., Latimer, B., Barzilai, O., & Marder, O. (2017). Manot 1 calvaria and recent modern human evolution: an anthropological perspective. Bulletins et mémoires de la Société d'anthropologie de Paris, 1-12.

7. Abbas, J., Slon, V., Stein, D., Peled, N., Hershkovitz, I., & Hamoud, K. (2017). In the quest for degenerative lumbar spinal stenosis etiology: the Schmorl's nodes model. BMC musculoskeletal disorders, 18(1), 164.

8. Yeshurun, R., Tejero, j.-M., Barzilai, O., Hershkovitz, I. and Marder, O. (2017) Upper Palaeolithic Bone retouchers from Manot Cave (Israel): A preliminary analysis of (as yet) rare phenomenon in the Levant. In Hutson J.H., Gaudzinski-Windheuser S. (eds.). Retouching the Palaeolithic. Römish-Germanisches Zentralmuseums, Mainz (in Press)

9. Marder, O., O. Barzilai, T. Abulafia, I. Hershkovitz, M. Goder-Goldberger. (2017). Chrono-cultural considerations of Middle Paleolithic occurrences at Manot Cave (Western Galilee), Israel. Replacement of Neanderthals by Moderns Humans: Testing Evolutionary Models of Learning. Springer, Japan (in Press)

ORGANIZATION

Organizing the symposium on aDNA with the Dan David Prize laureates

MUSEUM ACTIVITIES

Preparing the text for the human evolution and biohistory exhibition, and selecting items for the exhibition

EXCAVATION REPORTS

- Manot Cave: *see detailed report below*
- Tinshemet Cave: *see detailed report below*
- Har Safsuf Cave: *see detailed report below*
- Pe'quin Cave: *see detailed report below*
- Tabun Cave: *see detailed report below*

EXCAVATION REPORTS
Manot Cave

The 2017 Excavation Seasons at Manot Cave, Western Galilee, Israel (Permit Number G-63)

In collaboration with Ofer Marder[1] and Omry Barzilai[2]

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Introduction

Manot is an active karstic cave located in the western Galilee, Israel. Its original entrance, situated at its westernmost part, seems to have collapsed ca. 30 ka years ago, sealing the archaeological layers within. Previous seasons (2010–2016) exposed a series of UP occupations, while also indicating the presence of a Middle Paleolithic (MP) industry scattered within the cave (Barzilai et al. 2012, 2014, 2016; Herskovitz et al. 2015, 2017; Marder et al. 2013, 2017).

The paleoclimate conditions in the Manot Cave surroundings from 51-27 ka BP were studied based on the oxygen ($\delta^{18}O$) and carbon ($\delta^{13}C$) record of several stalagmites. $\delta^{13}C$ values of the speleothems suggest that the vegetation above the cave was mostly of C3 type with the development of very dense vegetation 36-27 ka BP (Yas'ur 2013). Superimposed on the general trend, short time-intervals were identified, in which harsh conditions developed. The sharp fluctuations in both $\delta^{18}O$ and $\delta^{13}C$ mainly between 35-27 ka BP points to frequent yearly and seasonal changes associated with period of global cooling.

Mountain gazelle (*Gazella gazella*) and Mesopotamian fallow deer (*Dama mesopotamica*) were most abundantly consumed at the site, respectively reflecting open landscapes and wooded environments (Schneller-Pels 2016; Orbach 2017). The micro-faunal record indicates mainly open landscapes, with a dominant presence of Guenther's Voles (*Microtus guentheri*; ca. 80% of the assemblage), alongside wood species such as *Apodemus spp*. (ca. 10%). Of interest are the remains of the Eurasian Snow Vole (*Chionomys nivalis*), which is limited today to Alpine environments (e.g., Mt. Hermon). Its existence support the isotopic evidence suggesting occasional colder intervals during the EUP (Comay 2017), as does the isotopic analysis of *Patella* shells found within the cave (Bar-Yosef Mayer accepted). The botanical remains are dominated mainly by almond (*Prunus* cf. *amygdalus*). Deciduous oak (*Quercus ithaburensis*) remains were also found, which might reflect an open-park landscape (Marder et al. 2017).

Twelve excavation areas have been opened so far (A–L; Fig. 1), of which Areas C, E and I contain the best-preserved cultural layers. These areas display thick (about 2.5 m) stratigraphic profiles and extremely rich assemblages (Barzilai et al. 2012, 2014; Marder et al. 2013). While Areas E and I represent *in situ* occupations, the assemblages from Area C are found in secondary depositional contexts. Nevertheless, the chrono-cultural units in Area C are in agreement with the assumed stratigraphic order (Barzilai et al. 2016; Marder et al. 2017; Alex 2017).

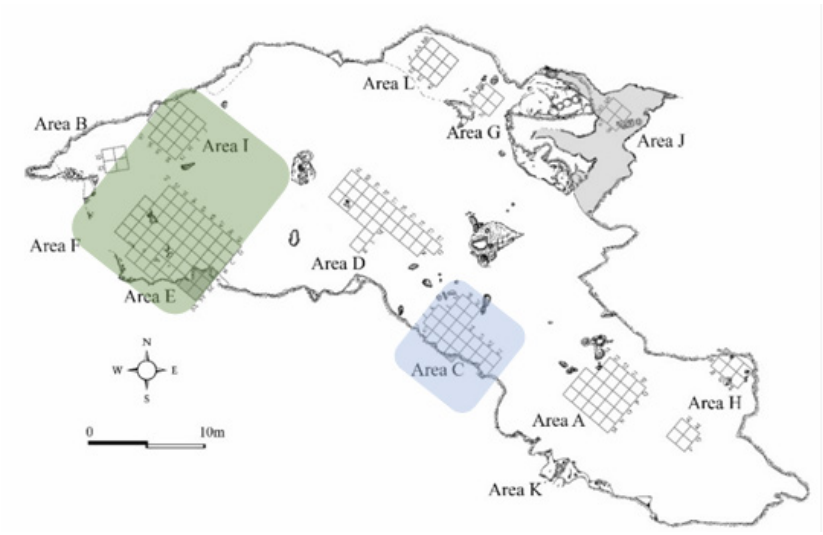


Figure 1: A general plan of Manot Cave with the location of the excavation areas. The areas in focus of the 2017 season are colored (Areas E, I, C).

This season, the focus was twofold:

1) Continue the excavation in the upper (northern) part of the cave, to further investigate the cultural sequence and variability and to refine previous stratigraphic observations.

2) Expanding the excavation in Area C, with the purpose of enlarging the sample of human remains.

The excavation was conducted in Areas E, I and C:

Area E

Area E is located at the top of the western talus, closest to the estimated location of the original entrance to the cave.

This season's excavation was focused on three localities:

10. **The northern most part of the area (excavation squares SY-B 90-92)** with the purpose of exposing more of Layer 2-III, which was partially excavated during the 2015 season. This was done in order to enlarge the lithic and faunal assemblages, so that comprehensive analyses and cultural affiliation could be established.

11. **The southern part of the area (excavation squares SY-B 85-87)**. Work on this part of the area had several objectives concerned with the characterization of Layer 2-IX (suspected to represent a dumping area) and of the sloping layers ascribed to Unit 3, which were exposed during the 2016 season. Additionally, an effort was made to excavate around the concentration of boulders uncovered in squares SZ-B 85 with the aim of clarifying issues such as time and degree of human involvement in its deposition. A major objective for this part of the area was to try and clarify the stratigraphic relations between the above mentioned elements and thus to retrieve valuable information about site formation processes.

12. **Excavation squares A-B 83-84 (Area E3)**. Were opened at the top of the slope separating Areas E and C. These squares are separated from the main excavation in Area E by a large stalagmite and several layers of flowstone. Excavation in Area E3 was aimed to explore the area closest to the cave wall, with the hope of uncovering additional human remains.

Stratigraphy

A few additions were made to the basic stratigraphy defined in previous seasons. A new archaeological layer, numbered 2-X, was added to the sequence in Unit 2, after it became clear that the finds associated with these layers, underlay Layer 2-IX. Another addition was the subdivision of Unit 3 into layers, following the numbering system of Unit 2. Four layers were defined, referring to the sloping layers identified in the sections of the deep sounding excavated during the 2016 season, interchanging between red-brown and partially cemented white-greyish sediments, as will be described below.

Layer 2-III

The excavation focused on squares A-B 90-91, exposing the remains of L515-L517 which were defined as hearths ascribed to Layer 2-III in past seasons. A large combustion feature was exposed (Fig 2), encompassing L515-L517, and covering most of square B 91, the northern part (sub squares a, b) of A-B 90, the southern part (sub squares c, d) of B 92 and the western part (sub squares b, d) of A 91. To prevent confusion, the combustion feature as a whole, was referred to as L 517 throughout the season. While in squares A-B

91-92, L517 was exposed under a yellowish-brown sediment, associated with the upper layers of Unit 2, the covering sediment in squares A-B 90 was silty dark brown and is probably representing the remains of Unit 1.

L517 displayed changes in sediments color, altering between red, black and white, implying that this combustion feature is in fact composed of several hearth, their exact position changing through time.

In squares A-B 90, a concentration of finds (L528, Fig. 3) was exposed embedded in a yellowish brown sediment 1-2 cm above the combustion feature. Finds from this locus included flint artifacts, animal bones and large amount of charcoals. The items were not burnt, and are considered to represent a late stage of activity associated with L517, probably when the hearth was located to the north or south. Another possibility is that L528 represents a later phase of activity, and should be ascribed to Layer 2-II.

A second concentration of finds was identified towards the end of the season, in the northern part of B 92 (sub squares a, b), embedded in a greyish, brecciated sediment. The stratigraphic relations between this brecciated sediment and combustion feature L517 are not clear, and will have to be studied in the following seasons.

Figure 2: Layer 2-III, conmustion feature L517. Looking south.

Figure 3: Finds embedded in yellowish sediment, on top of the ash layers of combustion feature L517. Looking west.

Layer 2-IX

Layer 2-IX was identified and defined during the 2016 season. Its proximity to the sloping layers identified in the deep sounding (squares C86-87), as well as its location at the southern edge of Area E, near the top of a steep slope leading to Area C, have led to an hypothesis that this layer is in fact a dumping area, used for waste disposal. A dense layer of bones (L524; Fig. 4) in which ash concentrations were identified gave further validation to this hypothesis, assuming that these were waste, dumped at the edge of the activity area.

During the 2017 season, a large portion of the bone layer was removed in squares SZ 87 (b, d) and A 87 (a, c), exposing an oval hearth, ca. 50 cm in diameter (east-west; L522; Fig. 5). The hearth is composed of a central white ash concentration, surrounded by a ring of black ash and an outer ring of baked, orange sediment. This color division is caused by the difference in temperatures between the inner and outer part of the hearth, and is indicating that this is an *in situ* combustion feature, thus disputing the dumping area hypothesis.

Next to L522, several finds concentrations were uncovered, indicating activities around the hearth:

1) Three large stones, possibly anvils or work platforms, were found in squares SY 87b, SZ 87b. 2) A flint concentration, containing several cores (made of at least two different flint types) and a large amount of bladelets were found in square SZ 87c. 3) A dense bone concentration (L531), containing at least two

whole gazelle skulls and three complete turtle shells, was found in square SZ 87d. However, there are no distinct burning signs on the bones in L531, and, in fact, it is very similar in composition to L524, the bones concentration that was deposited on top of hearth 522. Assuming that L531 and L524 are representing the same deposition, they could either represent an *in situ* activity around the hearth, which was partially washed as a result of post depositional processes; or they could represent a later phase, possibly a dumping activity associated with one of the upper layers, which was deposited on top of the combustion feature. Nevertheless, it is clear that Layer 2-IX should be regarded as representing an *in situ* occupation.

Figure 4: Bone layer (L524) covering hearth L522.

Figure 5: Hearth 522, looking north.

Layer 2-X

During the final stages of this season's excavation, after the removal of a part of Layer 2-IX, a change in sediment was observed in square A87c (Fig. 6). The newly exposed sediment is dark yellowish, and was so far exposed only in this square. In this sediment three long bones were exposed, possibly still laying in anatomical articulation. Work on this layer was suspended until the removal of Layer 2-IX would be complete.

Figure 6: Layer 2-X, exposed after removing a part of hearth 522. Looking north.

Squares SZ-B 86 (the boulders line)

Due to logistical considerations, during the 2017 season, an effort was made to clean and clarify the stratigraphic position of the boulders exposed during the 2016 season in the southernmost part of Area E, as to enable their removal. Digging around the boulders (mainly in squares B 85-86) we have exposed two overlaying brecciated layers (Fig. 7). Both brecciated layers are composed of brown-red cemented sediments rich in archaeological finds. Both layers are confined to the immediate proximity of the boulders, and are thickest and most cemented on and between the boulders. The correlation of the cemented sediments to the archaeological layers is not completely clear yet, however their composition indicates that they should be associated either with Layer 2-IX or with Layer 2-X.

Figure 7: Cemented sediment (lower brecciated layer) covering the boulders in B86. Looking west.

Squares B 87, B 86 b,d- the sloping layers (Unit 3?)

During the 2016 season, a series of sloping layers were identified, in the sections of the deep sounding in squares C 86-87, interchanging between white-greyish and brown-reddish sediments (Fig. 8). Work on these layers during the 2017 season, was limited due to their exposure only on the eastern-most part of the excavated area. The aim was to characterize them, try and clarify their stratigraphic position and their relation to Layer 2-IX, and determine the degree of human involvement in their deposition. Four sloped layers were excavated this season, temporarily named Layers 3/I-IV (similarly to the numbering system of the archaeological layers in Unit 2). Layers 3-I and 3-III, are composed of brown-reddish sediment with a low density of finds. Whereas Layers 3-II and 3-IV, are composed of white-greyish sediment, rich in ash and in archaeological finds and partially cemented.

Two main hypotheses were established regarding the stratigraphic position and the relation of these layers, to the archaeological Layers 2-IX and 2-X:

1) Layers 3/I-IV were deposited on a natural slope, that predates the deposition of Layers 2-IX, 2-X. Considering the boulders' location, they could have acted as a natural (or human made) sediment trap, forming a leveled area for human activity during Layers 2-IX, 2-X deposition. Thus, the inclination of Layers 3/I-III marks the natural inclination of the slope.

2) Layers 3/I-IV, are a local phenomenon originated in human activity, and should be correlated to the archaeological Layers in Unit 2. According to this hypothesis, Layers 3-II, 3-IV could represent a dumping activity, probably to a natural slope at the edge of the activity area.

These hypotheses will have to be tested in the following seasons.

Figure 8: Deep sounding section (C87) Looking west.

L525 (SZ 86)

A dense concentration of finds, containing animal bones, flint artifacts and charcoal fragments, were uncovered while working around the boulders' line in square SZ86 (Fig. 9). This concentration is embedded in a dark- yellowish sediment, quite similar to the sediment characterizing Layer 2-X. Items were found in close proximity to the boulder in SZ86 and were laid in various positions, some of them almost vertically inclined. This have led to the proposition that the finds were washed post-deposition (originally were a part of Layer X?), and trapped in their current position by the boulders' line, acting as a natural blockade. Work on L525 was suspended until the removal of Layer 2-IX will be completed.

Figure 9: L525, Looking south-west.

Area E3 (squares A-B 84-83)

Four excavation squares were opened at the top of the slope separating Areas E and C. These squares are separated from the main activity in Area E by a stalagmite, as well as by the boulders' line, exposed in squares SZ-B 85-86. Work in these squares was conducted during the last two weeks of the season, with the aim of exploring the area closest to the cave wall, hoping to find human remains.

For the most part, the sediments excavated in Area E3 were of the clayey dark-brown of Unit 1. Several layers of flowstone were identified during the excavation, displaying an inclination towards the south-west. The Unit 1 sediments contained large amounts of animal bones, which were associated with hyenas' activity within the cave.

In the last days of the excavation, at the northern part of squares A-B 84 (sub squares a, b), a carbonated layer, rich in archaeological finds was exposed,. This layer is composed of a white-grey sediment, containing large amounts of charcoals, animal bones and flint artifacts (Fig. 10). Special finds include a dentalium shell, a bone borer and a human fourth metacarpal bone, possibly displaying bite-marks caused by hyenas. It was suggested that the layer exposed in E3, represents a part of one of the archaeological layers found in Area E, washed down underneath the covering layers of flowstone. The composition of the assemblage from this layer is most resembling the assemblages from Layers 2-V and 2-VI.

Figure 10: Area E3. Western section and the top of the archaeological layer looking north-west.

The 2017 season was concentrated on the southern part of Area E, with the purpose of clarifying stratigraphic issues, and to better define Layer 2-IX. Work was also conducted in the norther part of the area, further exposing Layer 2-III and enlarging the assemblage.

Comparing Layers 2-III and 2-IX, some differences were observed:

1) Combustion features morphology: Layer 2-III presented a large combustion feature, ca. 1.5m in diameter. It is composed of several overlaying hearths, and is probably representing a long period of activity. In contrast, Layer 2-IX presents a single hearth, ca. 50cm in diameter.

2) Finds density: Layer 2-III presented a thin concentration of finds, overlaying the ash layers in the southern part of combustion feature L517. Layer 2-IX presented dense accumulations, rich in bones and flint artifacts surrounding and overlaying hearth L522.

Both layers represent *in situ* activity, related to a combustion feature. The differences between them could represent either a cultural variance or a difference in site function, and will have to be further studied in the future.

The sloping layers in the southeastern part of Area E, seem to represent some sort of human activity, and could be the result of a concise waste disposal, or of a washing down of sediments from the upper archaeological layers. The stratigraphic relation between these layers and Layer 2-IX remains unclear for now.

An archaeological layer was uncovered in Area E3, presenting rich assemblages. For now, this layer is considered to represent washed sediments originated in one of the archaeological layers of Area E, possibly Layers 2-V/ 2-VI due to the resemblance in assemblages composition.

Further work in Area E will concentrate on removing Layer 2-IX, followed by the exposure of Layer 2-X. The stratigraphic relations between the archaeological layers of Unit 2 and the sloping layers associated with Unit 3 should also be further investigated.

Area I

Area I, is located along the cave's northern section, and based on the excavations in area E, was most probably the back of the cave (Figs 1, 11). Following the evidence of a large combustion feature in squares F94-F95 last season, the aim this year, was to get a better understanding of the feature, map and sample all components and try to understand the extent and thickness of the hearth and associated archaeological layers. The second objective of this season was to widen the test pit in Square K94 and see if we can widen the exposure of the lowest level reached at the end of the previous season. The importance of this was due to the understanding that within the lower elevations of K94 there was a change in technology which seemed to have occurred, as well as, a higher percentage of Ahmarian artifacts were present.

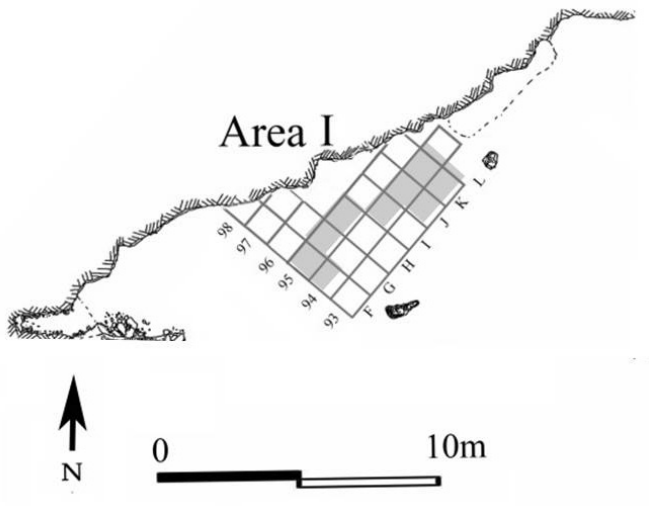


Figure 11: A plan of area I. Marked in grey are the squares excavated in 2017.

The same three stratigraphic units defined last year continued to be relevant to this excavation season although, some changes were made following the understanding that the hearth in squares F94-F85 was consecutively used over a period of time. Three archaeological levels were identified, each including remains of a combustion feature and a patchy crust, which varies in hardness and thickness, never exceeding a thickness of 10cm. Artifacts were found sporadically throughout the excavation.

Stratigraphy

Flowing season 2017, the sedimentological units and archaeological layers remain unchanged (Fig. 12). However, the combustion feature L.900a seems to be more complex than thought at the end of last year. A new combustion feature L.906 was defined within Layer 3. A Full description of the units and layers appears in the 2015 and 2016 reports. In this report we will focus on L900a and L.906 as well as the deep sounding of squares K/J93-94, excavated this season.

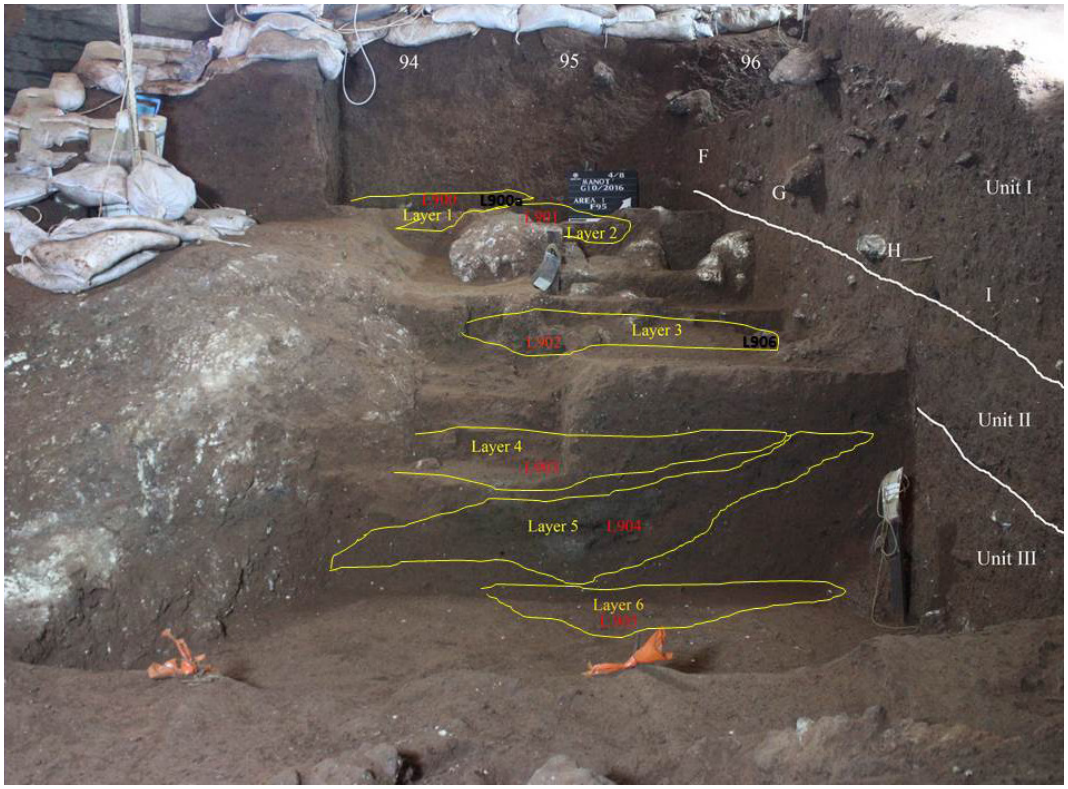


Figure 12: All Units, Layers and Loci as defined for area I. In black are two new Loci added in 2017 season.

L. 900a

This Combustion feature was noted as L. 901 in the 2016 report. It was only after excavations this season that it became clear there was another combustion feature between L. 900 and L. 901 and thus was numbered L. 900a. Combustion feature L. 900 is currently seen only in the section F94/E94 at an elevation of 220.63. L. 900 is, ~ 5 cm above the white hard concretion that covers L. 900a and covered a much smaller area. L. 900a, at an elevation of 220.58 cm down to 220.48, is large and covers all of square F94 and extends into F95 (Fig. 13). The hard crust above this feature covers the large rock seen in section G/F 94 and it seems that combustion feature L. 900a was formed on the rock. In section F94/95 ~5 cm bellow L.900a there is a layer of bladelets, (Fig. 14), within a layer of grey sediment probably representing another combustion feature that should link with L. 901.

In the feature, there was a concentration of burnt bone, very fragile and white in color. This is the only bone preserved in Layers 1 and 2. The cemented orange sediment at the back of the hearth seems to represent baked clay. This clay is found within a hard block of burnt black sediment with an extent of ~10cm^2. The change in L. 900a as it was excavated is documented in appendix A.

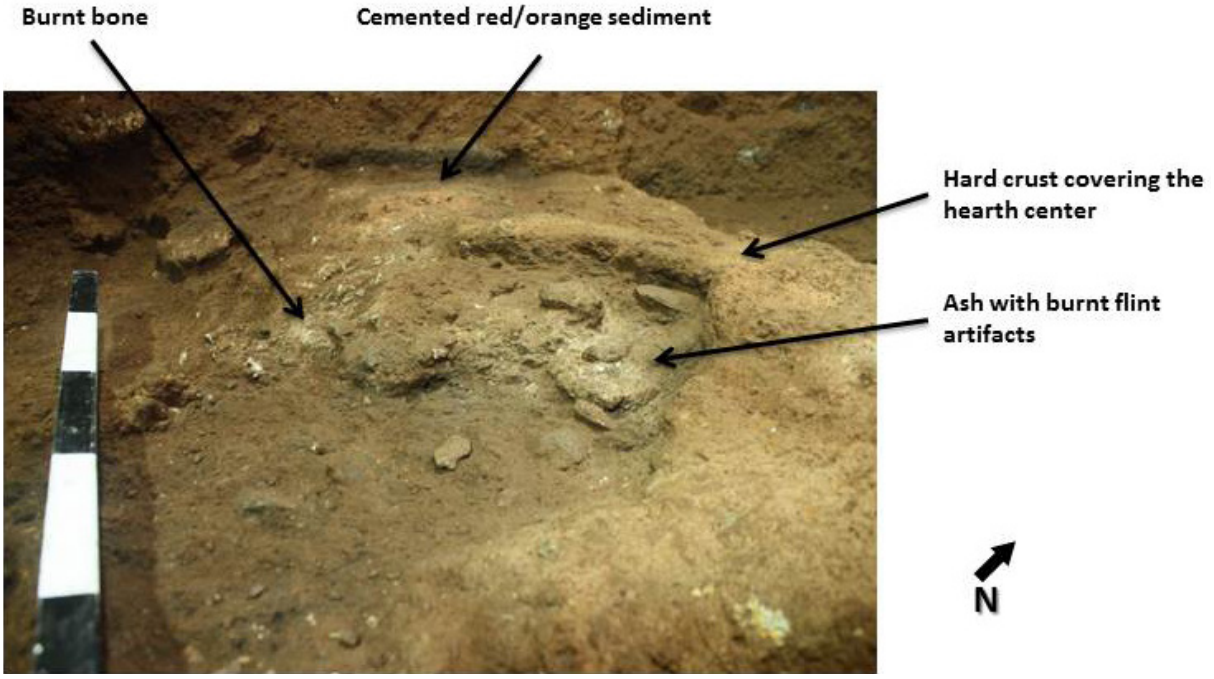


Figure 13: Map of L.900a, at the beginning of the season, prior to the removal of burnt flint artifacts and the hard crust covering the hearth's center.

Once the hard concreted crust was removed, (app. 3 cm thick), it was clear that the black ash and burnt flint artifacts extend over a larger area than first thought, strengthening the suggestion that the concretion was formed once the feature was abandoned, remaining exposed to dripping from the cave ceiling. Within the ash, there is preservation of bone. These are fragmented and white, probably burnet. This is the only bone preserved in Layer 1.

A sediment block (B. 9428) was removed from the section of F95d at elevations 220.54 to 220.46. This block included the upper level reach in calcitic nodules which was poor in artifacts and a lower level which was softer and had more artifacts.

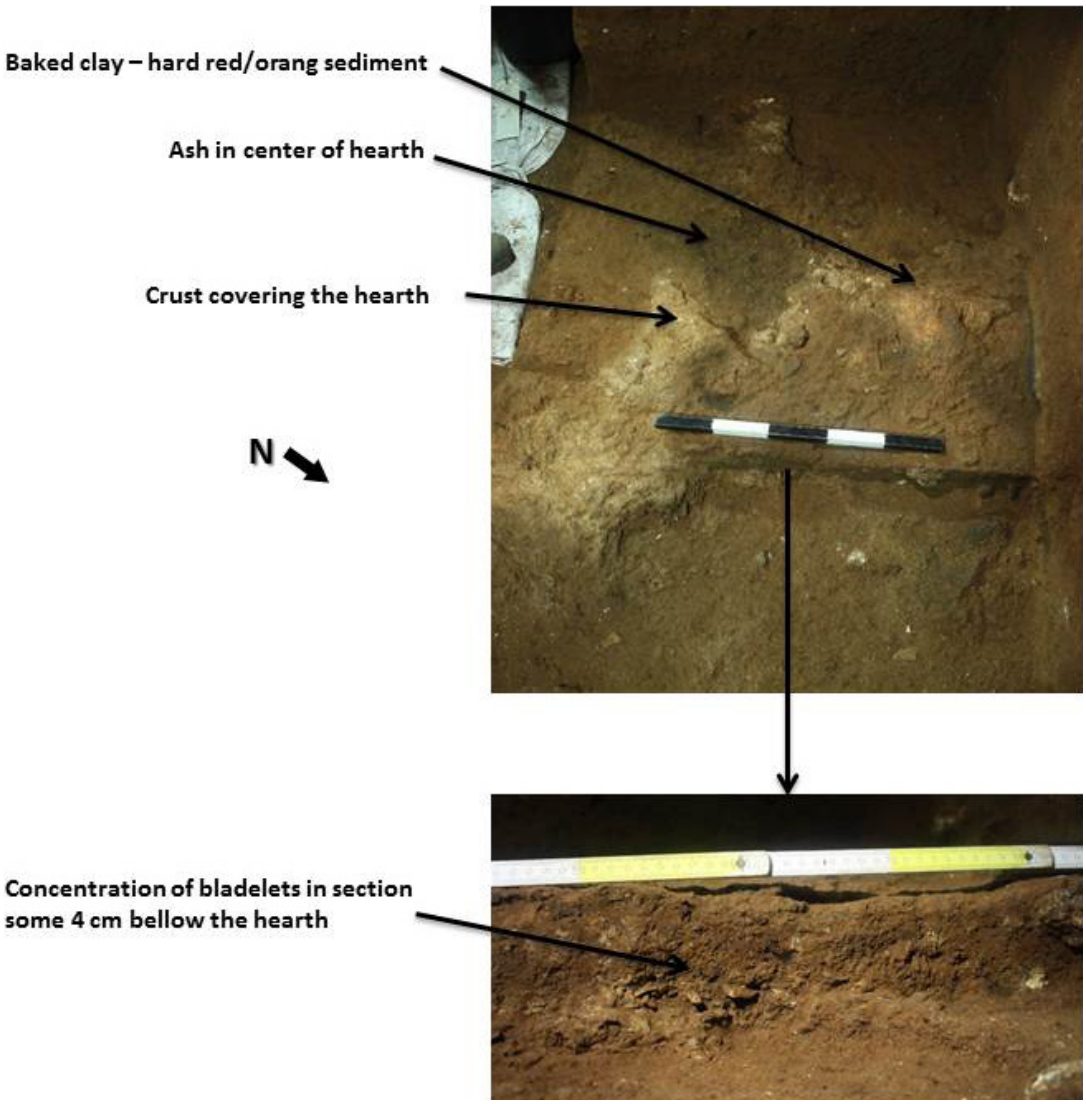


Figure 14: L. 900a at the end of the season, as well as the layer of flints in section F94/95 some ~5 cm below the black ash concentration in F94.

The Combustion features in Sq.F94-95, (L.900, L.900a and L.901), are associated with anthropogenic Layers 1 and 2, defined in previous seasons. These features have a depth of some 10cm, although the lower boundary of the feature has not been reached yet. The lithic finds from these layers are few and include mainly bladelets and flakes. Burnt flint artifacts were found in the center of the combustion feature and were piece plotted with the total station.

L. 906

This combustion feature differs from all Layers and Loci in the good bone preservation. The combustion feature is composed of grey sediment and bones. A thin calcitic crust is evident above the feature and is clearly seen in section H95/96 (Fig. 15). Following the calcitic crust, it looks like L.906 extends into G95. The work on these feature started towards the end of the season, so further excavation is needed to fully understand its extent and its stratigraphic relation to L. 902 (Fig. 12).

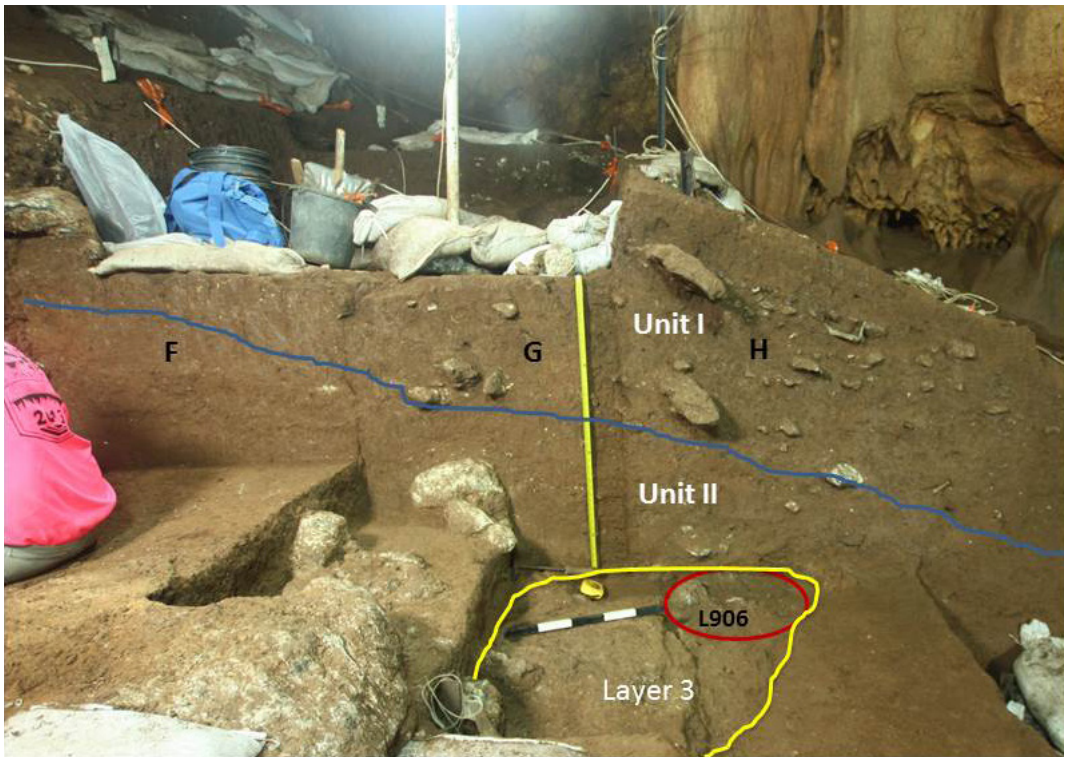


Figure 15: L. 906 as seen in square H95.

The uniqueness of Combustion feature L. 906 is in the presence of bones, however, they are few and in most instances poorly preserved.

Deep Sounding in Sq. K93/94 and J93/94

Based on the appearance of an Ahmarian component within the bottom 10cm of the deep sounding the previous season, the deep sounding was widened in order to enlarge the collected sample and in search of a distinctive Ahmarian occupation layer. The squares were excavated in 10cm spits and one of two buckets was wet sieved. When change in sediment, was evident all material was sent to be wet sieved.

The squares were excavated to a depth of 2m, down to an elevation of 217.6 at the top of the flow stone in Sq. J94 and K94 and 217.48m in Sq. J93 and K93. The flowstone extends from the cave wall to the large boulder in Sq. I/J93, (Fig. 16).

During the excavation in Sq. J94 and K94 the top of the flowstone was exposed at an elevation of 218.2 the top of the flowstone appeared along the northern section (Fig. 17), with a clear differentiation of the sediment in the square into three different colors and textures and thus excavated in different baskets.

Squares K93 and (4 at the end of the excavation. The flowstone at the bottom has a clear inclination (marked by the black arrow) going from the cave wall towards the large rock (bolder? Bedrock?)

Figure 16: inclination of the flow stone at the bottom of the deep sounding.

At elevation 218.20 cm there was a clear differentiation in the sediments at the bottom of sq. K94. each sediment was excavated as an independent basket. A line of yellow nodules forms the border between the reddish and grey sediments

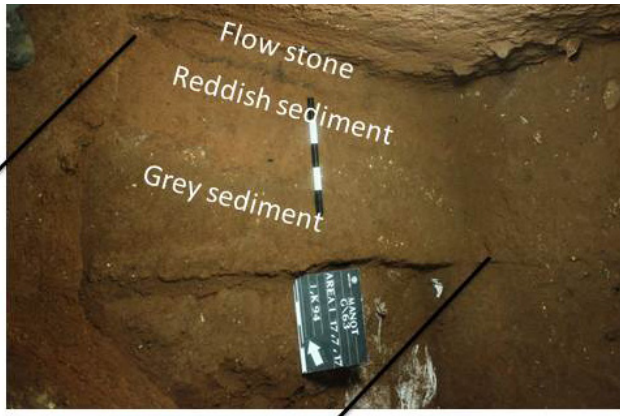
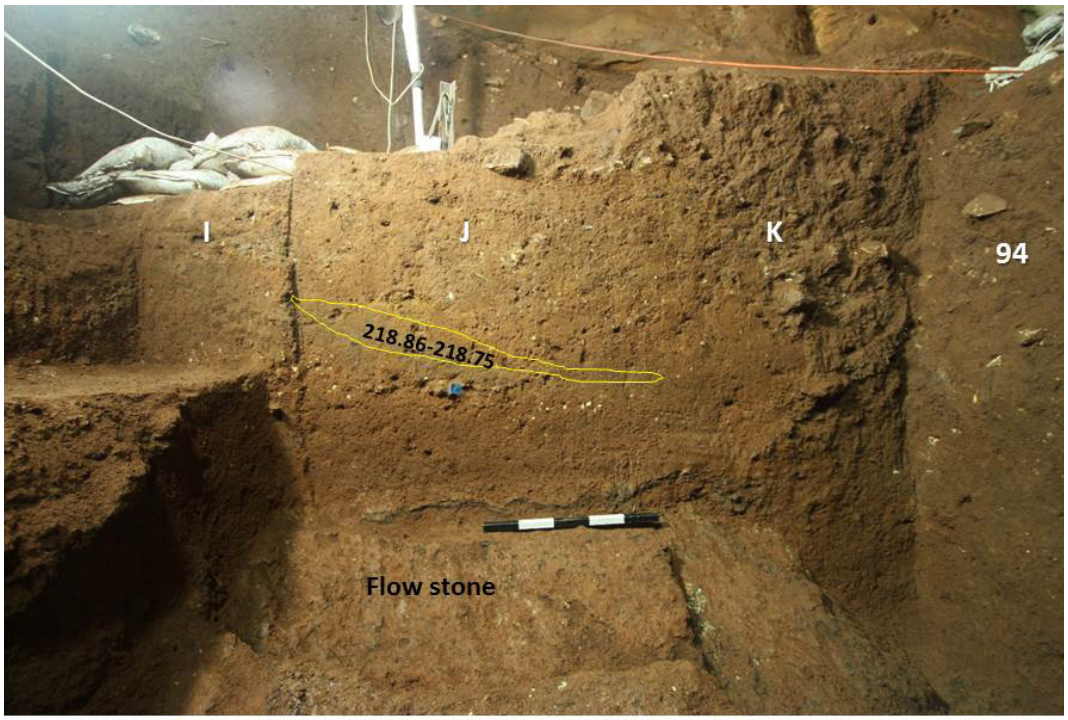


Figure 17: The differentiation in sediments in Squares K94 and J94 at an elevation of 218.20

In Square J94 a grey patch appeared at an elevation of 218.87 and possibly continued into Sq. K93. The sediments from this patch were sampled by E. Boaretto. The baskets corresponding with this patch (Fig. 18) were interesting, as the lithics associated with it included two core tablets which seem to belong to a technological system of narrow fronted cores (B. 9382).

At the top of the section (section J/K93-94) the sediment is reddish/brown, rich in clay with variable amounts of white and yellow nodules, (Fig. 18). Bellow the large rock in the northern section the sediment changes, the levels have a steeper decline, and there is an interchange between soft sediment and hard concreted levels. Variable amounts of flint appear throughout the deep sounding, and bones, while still very few, seem to appear mostly below the large rock. In the lowest 40cm, there seems to be a change in the flint tradition, with higher percentages of blades and blade cores. This change in technology was also noted at the same elevations in the deep sounding of Area E. In section K93/92 there is a dark level of 4-5cm thick with charcoal and could indicate the presence of a hearth (218.20m).



Marked in yellow is a patch of soft grey sediment. Interestingly it contained several flint artifacts (B. 9382) which seemed better associated with the Ahmarian than Aurignacian which appears above and bellow.

Figure 18: Section J/K 94 with the grey patch as seen in the section.

The lithics coming from the deep sounding mostly represent an Aurignacian assemblage excluding B. 9382 which seems more Ahmarian. The Aurignacian artifacts include; an El-Wad point and a carinated scraper (B. 9360), two bladelet cores (B. 9391, 9392), a bladelet core, a carinated scraper, blades with a bidirectional scar pattern and many bladelets (B. 9388). A unique find is a small polished pebble found within the calcitic crust of sq. G95 (B. 9430). Several flint artifacts were also found associated with this crust.

Area C

Area C is located in the lower part of the cave, at the bottom of the slope that descends from area E. Previous seasons have shown that area C is rich with archaeological finds, which originates, probably, from

the living area at the top of the cave. No living surfaces were found so far in area C. The finds in previous seasons included some human bones and teeth.

The sediments in area C are composed of loose soil with a varying number of rocks of different sizes. In the previous seasons, eight sedimentological units were identified based on field observations as to the amount of rocks and density of the soil in each unit.

The aim of the excavation in area C this season was to extract as much sediments as possible from the slope of soil, in search of human remains. All the sediments were wet-sieved and scanned for possible human bones and teeth.

The work in area C (Fig. 19) was carried out in columns J-K. Rows 66-67 which were excavated in previous seasons were also excavated this year. In addition, new squares were excavated in rows 68-70, plus one square in J-71. All the new squares were excavated in 1x1m units, in 10cm spits for each basket. Rows 66-67 were excavated in 0.25 square meters units, mostly in 5cm spits.

Figure 19: Area C, general look, end of season

Row 66 (Fig. 20)

In Square J-66, about 40cm of sediments were removed, and in Square K-66 about 55cm were removed. In both squares, there were big rocks and loose soil among them, with evidence of small channels in N-S direction. On the eastern side, there was also a crust with flint and bones embedded in it. The archaeological finds were predominantly of the Ahmarian culture, with many narrow and bipolar cores, and El-Wad points. The density of artifacts varied in between spits, but we could not find a pattern for the diversity.

Row 67 (Fig. 20)

In Square J-67, about 50cm of sediments were removed, and in Square K-67 also 50cm of sediments were excavated. The sediments in these squares were mixed – denser on the western and eastern ends of the row, looser in the middle. At the bottom, a few big rocks started to appear. The lithic finds are predominantly Ahmarian.

Figure 20: Rows 66, 67, end of season

Section 67/68 – "The Den"

In the section between rows 67 and 68 there is an opening to a cavity in the soil. This cavity was noticed a few years back. This season, while excavating row 67, more of this opening was exposed. It seems that there is a cavity which was dug into the dense soil, about 75cm wide, with a dome-shape ceiling. Inside the cavity there is a partial fill of very loose soil with some stones in it (Fig. 21). It seems that part of Squares J-67, K-67, where the soil was very loose, were part of this cavity.

The nature of this cavity is unknown. The best explanation is that it was an animal's den – hyena or porcupine (although it seems to be too big for the latter). We did not excavate inside the den (which lies mostly under Square J-68), and we did not reach its bottom yet.

Figure 21: A close look at the cavity, partly filled with soil and stones

Row 68 (Fig. 22)

This row is new and was excavated from the surface down to a maximum depth of about 90 cm. Both Squares; J-68 and K-68, contained soil which was dark, damp, loose, with a few stones of small size, (up to about 10cm in diameter). There seems to be a change to a somewhat drier soil at the bottom of the row, but it was hard to pinpoint.

The soil contained flint artifacts in low numbers at the top, with the density growing toward the bottom. The indicative pieces were mostly Aurignacian.

Figure 22: Rows 68, 69, end of season. Note the flowstone on the left (west).

Row 69 (Fig. 22)

This row is new and was excavated from the surface down to a maximum depth of about 150cm. The top few centimeters contained bones which match the ones from the 'Biogenic Unit' of area D, probably the result of hyenas' activity. Under the surface, the soil was loose, with patches of stones and some minor channeling. There was a layer of about 10cm in which there were almost no finds, and then, without any visible change in the soil matrix, there started to appear lithic and bone finds.

On the north-western side of the row, in sub-square J-69a, we exposed a flowstone which is probably connected to a stalactite on the edge of the excavated area, and slopes down to the south. At the end of the season, it covered almost the entire sub-square (Fig. 22).

There were hardly any changes in the sediments along the way down. There were some local patches of drier soil, stones, and some unclear concentrations of bones and flints. In general, the soil remained the same all along the profile.

The lithic finds showed a transition from undefined at the top to mostly Aurignacian and then to mostly Ahmarian at the lowest elevation reached. The density of artifacts was quite high for most of the time.

Row 70 (Fig. 23)

This row is new and was excavated from the top down to a maximum depth of about 65cm. As in row 69, the top layer of soil contained bones of the 'Biogenic Unit' (long bones and coprolites). Under it was a layer of loose soil with almost no finds at all, about 10 cm thick. Under this layer, the soil remained loose and damp, with occasional concentration of small stones, with flint artifacts and bone fragments.

On the west, there is a flowstone which slopes south and east, and covers part of square J-70 (Fig. 23). It is connected to a stalactite at the western side of the trench, and is the upper part of the flowstone exposed in J-69, (though they are not connected visually, there is still some soil to be removed in J-70 to expose the full length of the flowstone).

Row 71 (Fig. 23)

In row 71, only one square was excavated, J-71. This is a complex square, with a massive flowstone covering about 40% of its area, on the north-west. We exposed the southern end of the flowstone, which runs diagonally from SW to NE (of the grid). There were two types of sediments in the square, one from under the flowstone, and the other was not covered by the flowstone.

The soil which was not covered by the flowstone was excavated down to a depth of about 110cm. The soil was the same as in rows 68-70, loose, damp, with some small stones and with the same sequence of finds as in row 70. Some big bones and coprolites were found in the top-soil, then a few cms without any finds, and then flint artifacts and bone fragments. The flint artifacts, as far as they can be judged in the field, were not indicative enough.

Figure 23: Rows 70, 71, end of season. Square K-71 on the right was not excavated. Note the big flowstone covering part of J-70 and J-71.

About 40cm of soil were excavated under the flowstone in Sub-Square J-71a. The sediments under the flowstone constitute alternating **horizontal** layers of thin crusts, thin flowstones and dry and crispy soil. In these sediments, there is a small number of flint artifacts and bone fragments. The flint artifacts were not indicative.

Figure 24: A close look at the section under the flowstone in square J-71. Note the horizontal thin flowstones and crusts.

Human Remains

Four human remains were found within the sediments extracted from Area C: A premolar, found in Square K 69; a molar, found in Square K 68; a cuboid bone, found in Square J 66b; a metatarsal, found in Square J 67. In addition, a human fourth metacarpal bone, possibly displaying bite-marks caused by hyenas, was found within the archaeological layer exposed in Area E3.

Summary

Eight excavation seasons in Manot cave, (2010–2017) have revealed a remarkably well-preserved UP sequence indicating the presence of Mousterian, Early Ahmarian and Levantine Aurignacian techno-complexes, (Barzilai et al. 2016; Marder et al. 2017). Research on the innermost parts of the cave, (Areas C, D; Fig. 1), have enabled a preliminary chrono-cultural study, yielding finds associated with these cultural entities. However, the assemblages from these areas are considered to be in secondary deposition. In contrast, Area E, considered to represent *in situ* accumulations, have presented approximately 2.5m of Levantine Aurignacian (Sensu lato) sequence, containing ten distinct layers.

Preliminary analyses suggest that the Aurignacian technological system displays a high degree of diversity as manifested by at least four distinct *chaîne opératoires*. These include blade/let knapping sequence, of which some were modified into el-Wad points, production of large Aurignacian retouched blades, preparation of massive tools including retouched and denticulate items, and the production of twisted bladelets from carinated items. A similar phenomenon was noted in European Aurignacian contexts, where it was interpreted as an indication of diachronic and synchronic changes, (e.g., Bon 2002; Bordes 2006). An additional phenomenon was the common re-use (or recycling) of MP artefacts, mostly shaped into carinated items, (Marder et al. 2018). This behavior has been noted in many of the other Levantine Aurignacian sites, (e.g., Belfer-Cohen and Bar-Yosef 2015), but is almost absent in European and Early Ahmarian assemblages. The use of ungulate bones as "retouchers," a very common phenomenon in the MP and UP of Europe but rare in the Levant, was also identified in Manot, (Yeshurun et al. 2017).

Detailed zooarchaeological and taphonomic studies of the macro-faunal remains from Area C attest to a greater reliance on gazelles and small game species in Levantine Aurignacian assemblages relative to those of the Early Ahmarian, possibly indicating a higher occupational intensity in the former, (Schneller-Pels 2016). Preliminary observations indicate that the faunal assemblages from Area E are very well-preserved, thus carrying a great potential for understanding animal subsistence in the cave.

The Aurignacian bone and antler tool assemblages, as well as the personal ornaments made of teeth (Fig 7), are unique in their high number of tools and their variety among the Levantine Aurignacian record (Tejero et al. 2016). The production methods and typology of antler tools strongly resemble those characteristic in European Aurignacian assemblages.

The mollusc shell assemblage from Manot consists of two groups, (Barzilai et al. 2016; Bar-Yosef Mayer, 2017): Marine and land snails used for subsistence, including *Pattela, Phorcus* and *Levantina,* Some of the latter were found in clear association within and around combustion features, and shells used as personal ornaments. The shells used for personal ornaments are dominated by *Columbella rustica* and *Tritia (Nassarius) gibbosula* (mainly found in Area C), many bearing ochre residue on them. In Area E the *Antalis* spp. dominate. Two cowrie shells, uncommon in Levantine Aurignacian sites but relatively abundant in Europe, may suggest some common cultural affinities connecting the Manot occupants to the European Aurignacian tradition, (e.g., Taborin 1993; Vanhaeren and d'Errico 2006). A Pleistocene fossil

from the Jordan Valley, (*Syriomargaria [Viviparus] apameae*), may point towards the range of exploration of the Manot inhabitants.

A high-resolution chronological study of Manot Cave, based mainly on 36 radiocarbon dates, (28 from Area C; 8 from Area E), indicated that the Early Ahmarian is 46–42 ka years old and the age of the Levantine Aurignacian is 38–34 ka cal BP, (with a more precise range of 37–35 ka cal BP according to the Bayesian model; Alex, accepted). An age range of 33–34 ka cal BP has been suggested for the upper layers (I–III) of Area E.

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EXCAVATION REPORTS
TINSHEMET CAVE

The 2017 Season Excavation Report on Tinshemet Cave

In collaboration with Yossi Zaidner[1,2], Oz Varoner[3], Marion Prevost[1], Gadi Herzlinger[1], Reuven Yershurun[2], Kathryn Pocklington[2], and Naomi Porat[4]

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Introduction

Tinshemet Cave, also known as Mugharet al-Watwat (Stekelis, 1942), is located in central Israel, near the modern city of Shoham. The cave is located on a moderate slope on the east bank of the Nahal Bet-Arif stream, approximately 20 meters above the riverbed (Figure 1). The 2017 season of excavations revealed abundant evidence for human presence during the Middle Paleolithic including two articulated human skeletons, an adult, and a child 3-6 years old, as well as, an isolated tooth of a third individual. Tinshemet Cave is one of the very few MP sites with fully articulated human skeletons in a clear archaeological context providing a unique opportunity for studying the composition of the MP population of the Levant, their lithic culture, symbolic behavior and subsistence strategies.

Tinshemet Cave contains three chambers, the innermost having an open chimney. During the 2017 excavations season we extended the area of the excavation both on the terrace and in the first chamber of the cave (Figure 2). The habitation layers, discovered on the terrace of the cave and in the first chamber, were exposed on an area of about 90 square meters (Figure 2).

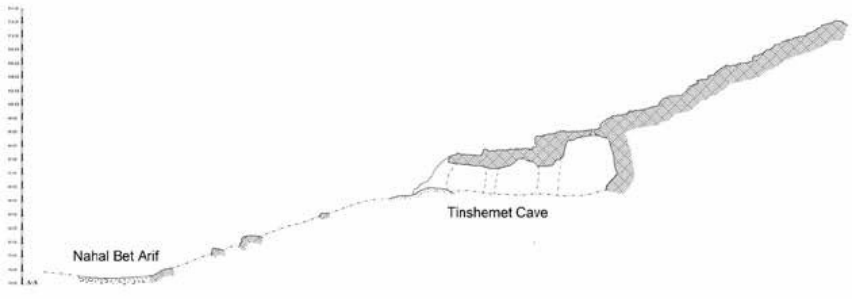

Figure 1: The section of the slope where Tinshemet Cave is located

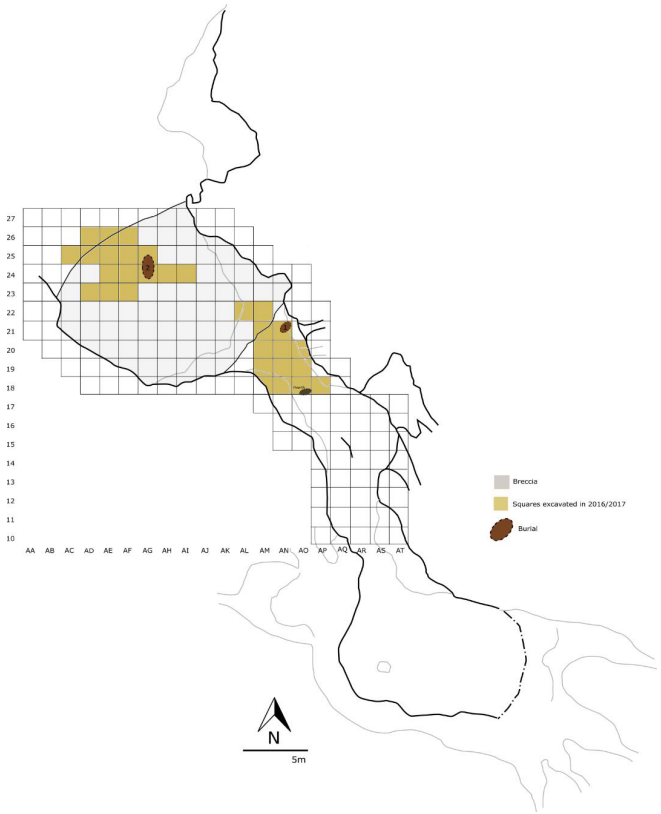

Figure 2. Plan of the Tinshmet cave and the excavated areas with location of burials and the hearth.

The Terrace

The terrace contains cemented Middle Paleolithic sediments (breccia) rich in lithic artifacts and animal bones. The Middle Paleolithic sediments on the terrace extend over an area of 40 square meters (Figure 3). The stratigraphy of the terrace sediments has not been changed from what described in the report of the 2016 excavation season and contains:

1. Topsoil (50cm thick) with abundant Middle Paleolithic artifacts and a few ceramic sherds of late historic periods.

2. Middle Paleolithic breccia layers (70cm thick). The breccia is moderately hard and contains both well-preserved lithics and bones amenable to retrieval.

Figure 3. The exposure of the Middle Paleolithic breccia layers on the terrace of Tinshemet Cave and the location of the articulated adult skeleton (marked by arrow).

During the 2017 excavation season, we continued to excavate the squares opened during the 2016. In addition, five squares were opened at the western part of the terrace (Squares AC-AE 25-26). The aim of the excavations in this part of the terrace was to reveal a possible location of the original entrance to the cave and to define the borders of the Middle Paleolithic sediments. The excavated squares showed compact brecciated layers covered by a soft brown top soil. The artifact-rich topsoil was in contrast to the relatively low-density breccia layers.

Four additional squares (squares AD-AE 23-24) were opened at the southern part of the terrace. Here, we continued to excavate a rich surface containing lithics, fauna and lamps of ochre that we began to expose during the 2016 season (Figure 4). In one of these squares, articulated human skeleton of an adult individual was discovered. The adult skeleton seems to be laying on his right side in semi-flexed position (Figure 5). The area around the skeleton shows concentration of the lumps of ochre and large flint flakes. The only marine shell retrieved so far (Bar-Yosef Mayer, pers. Comm.) is found in the same square with the

adult burial. These non-utilitarian artifacts could possibly serve in funeral rituals and will be excavated and studied during the 2018 season of excavations.

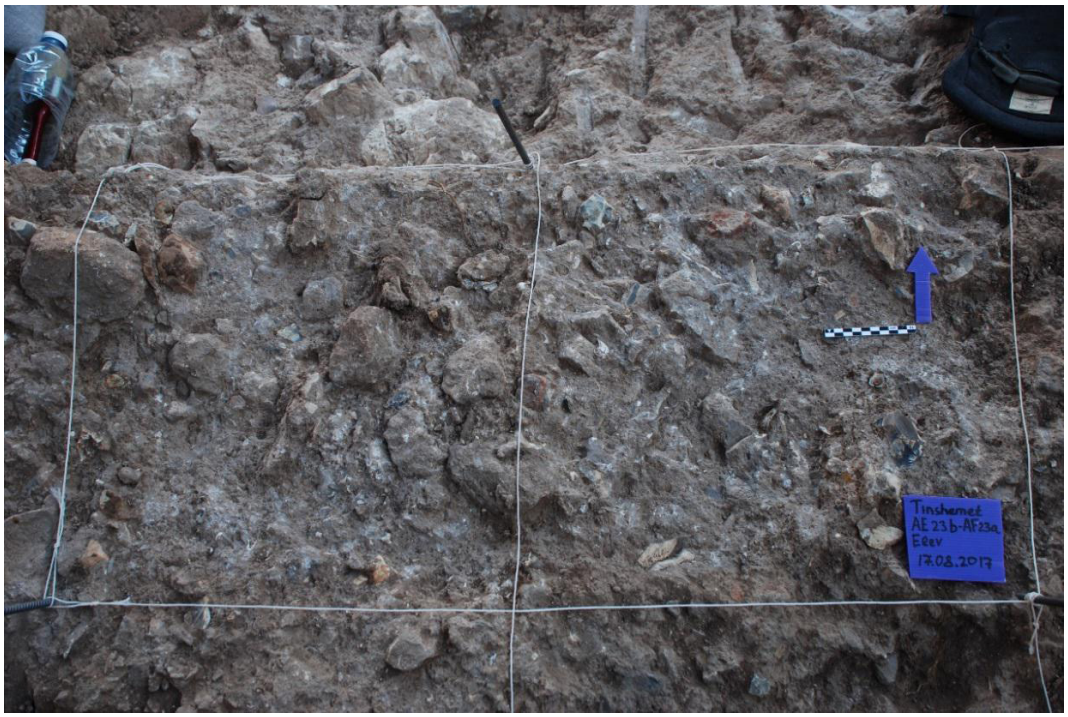

Figure 4. Surface exposed during the excavations of the terrace breccia layers with lumps of red ochre, lithics and faunal remains.

Figure 5. Articulated adult skeleton discovered in the Middle Paleolithic breccia on the terrace of Tinshemet Cave.

The First Chamber

In the first chamber, we continued excavating squares opened during the 2016 season. In addition, we opened a few squares at the inner part of the first chamber (squares AL-AP 18). The stratigraphy of the chamber reveals several soft layers of sediments containing Middle Palaeolithic artefacts. At squares AO-AP 18, a lens of black sediment with charcoal remains was uncovered (Figure 2). The lens indicating a presence of a hearth.

A child skeleton was found in small niche near the cave wall (Figure 2, 6). A few stones that were found around the skeleton are likely to mark the borders of the grave. The child was extracted in a block during the 2017 season and is currently under excavations in the Dan David laboratory, Faculty of Anatomy, Tel Aviv University. In addition, an isolated tooth of adult individual was found in square AM 19.

Figure 6. A child skeleton discovered in the first chamber of Tinshemet Cave. Note that the skeleton was placed in a small niche near the cave wall.

Lithics

The lithics' study is at its early stages. The dominant raw material is local Mishash formation flint, originated from the vicinity of the site. This is a fine-grained semi-translucent flint with black or brown appearances. In addition, several items were shaped on a raw material that is probably originated from a distance that exceeds 20 km.

The only core reduction sequence identified so far is the Levallois targeted at the production of flakes. The scar pattern on the dorsal surfaces of the Levallois flakes, indicate that the centripetal Levallois method was the dominant reduction strategy followed by unipolar and convergent unipolar knapping strategies. Retouch pieces frequencies, are relatively low.

Fauna

The taxonomic composition (Table 1) is varied and includes several ungulate species such as aurochos (*Bos primigenius*), mountain gazelle (*Gazella gazella*), equids (*Equus* sp.), Mesopotamian fallow deer (*Dama mesopotamica*), wild goat (*Capra* sp.), red deer (*Cervus elaphus*) and wild boar (*Sus scrofa*). The two most frequent species are gazelle and aurochs, followed by equids, cervids and the caprine, although the last two species were found in small quantities. Notably, small mammals are rare and tortoise and snake remains were not found during the 2017 season of excavations.

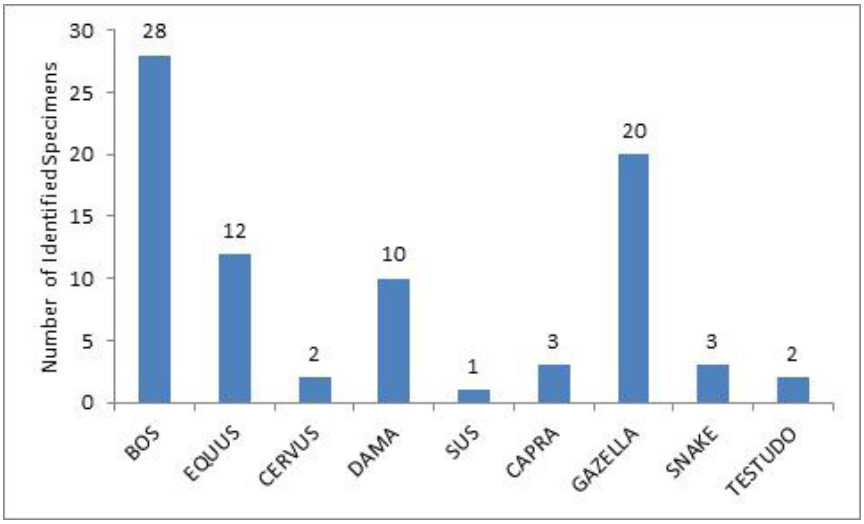

Table 1. Frequencies of taxonomic composition of the fauna assemblage.

TL Dating

Seventeen dosimeters for measuring the background radiation were inserted at different locations of the cave (Figure 7). Eight dosimeters were inserted into the soft Middle Paleolithic layers of the first chamber. Three dosimeters were inserted at the breccia layers in the proximity of the adult skeleton and six dosimeters were inserted in different spots on the terrace of the cave. In addition, burnt flint samples were collected from different locations of the site.

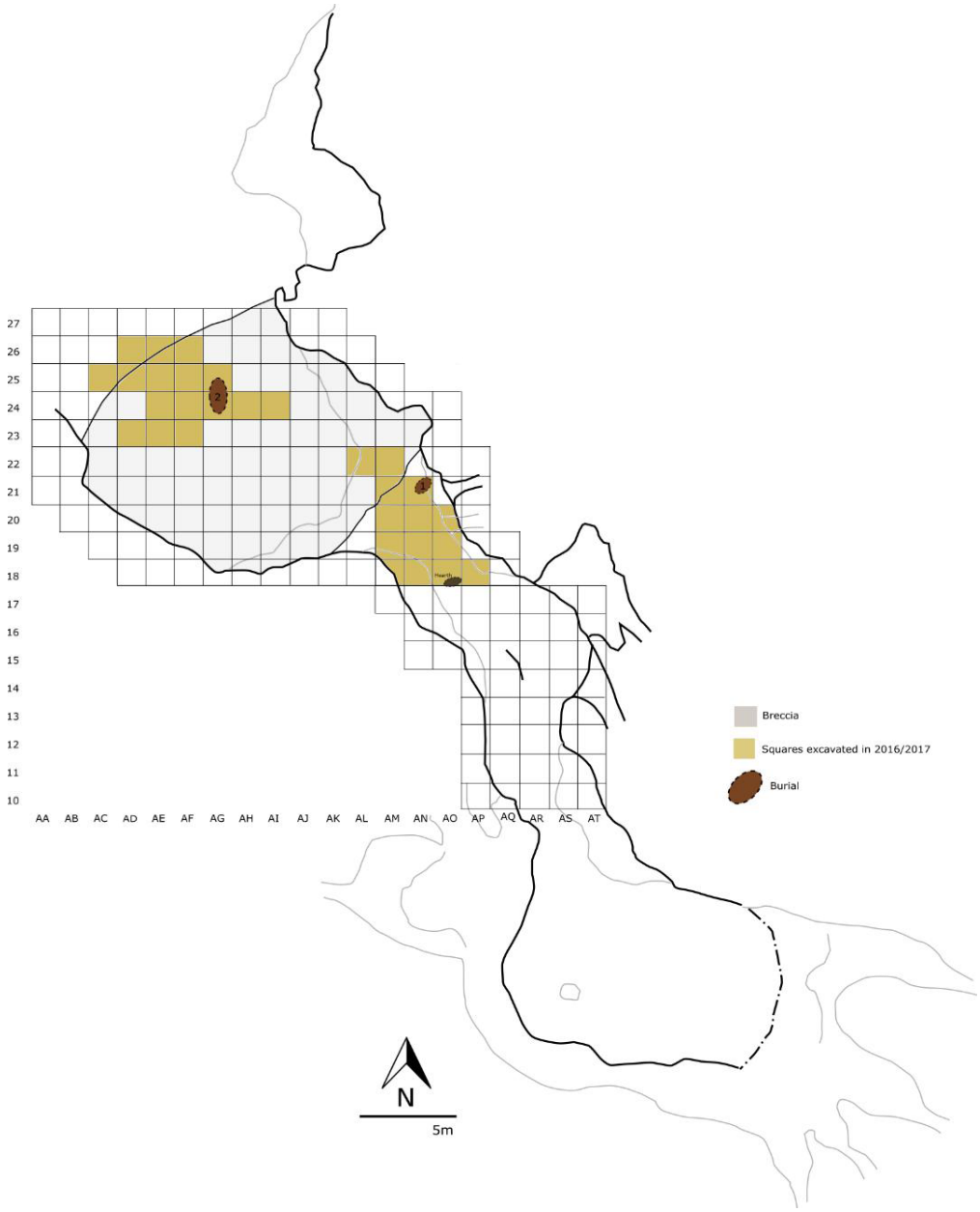

Figure 7. Plan of the cave with the location of the dosimeters (blue) and samples of the burnt flints (red) for TL dating.

EXCAVATION REPORTS
HAR SAFSUF CAVE

The 2017 Season Report on Har Safsuf Cave

In collaboration with Uri Davidovich[1] and Ofer Marder[2]

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Summary of Previous Research

Har Safsuf Cave was discovered in the summer of 2016. Upon its discovery, it turned out that it is one of the largest and most complex caves in the Upper Galilee, with a total length of passages reaching several hundred meters and with numerous vertical and horizontal obstacles. The cave is entirely dark, damp, and its present structure is the result of a long-lasting "aging" process, bisecting an original large karstic hall into numerous smaller spaces in several tiers. The entrance to the cave is through an 8m deep vertical shaft, and other shafts requiring abseiling are location in other parts of the cave.

Immediately following its discovery and initial mapping by members of Hebrew University's (HU) Israel Cave Research Unit (ICRU), it was recognized that the cave is packed with material cultural remains and bones (including human bones), scattered on the surface in most areas of the cave. A meticulous 4-day intensive survey of the entire cave followed (conducted by HU's Institute of Archaeology and ICRU), during which hundreds of diagnostic sherds, flints, stone and bone tools, beads and skeletal remains were collected and registered in relation to their find spots, and a detailed code plan was prepared. The survey results suggested that the cave was active mainly during one chronological phase, known as "pre-Ghassulian" Chalcolithic, Early Chalcolithic or Middle Chalcolithic according to several common schemes. Moreover, owing to the large material assemblages and the excellent preservation of material and ecofactual remains, it appeared that the Har Safsuf Cave is in fact, a major site for delineating the regional (Galilean) culture of this little-known time-frame (see more below).

During the survey, several concentrations of human skeletal remains were identified in difficult-to-access points in the cave system. In order to establish a better understanding of these seemingly unique burials, a one-week excavation was conducted in February 2017, headed jointly by Ben-Gurion University Department of Archaeology, The Dan David Center for Human Evolution and Biohistory at Tel-Aviv University, and HU's Institute of Archaeology. The excavations exposed at least one *in situ* primary burial of an adult female, and two other burials disturbed by later, post-depositional movement and sediment consolidation. In addition to the burial excavation, two other small areas were excavated, one containing a large scatter of flaked flint items, and the other, large amounts of charred grain seeds, both of which are located in the most spacious hall of the cave.

Research Conducted between March 2017 and February 2018

The main avenues of research conducted in the past year are within the realm of analysis of survey and excavation results. However, two aspects of complemented fieldwork were also part of this year's research:

1. Detailed mapping of several localities in the cave: In September 2017, we conducted a supplementary survey inside the cave, and drew enlarged maps and sectioned for four localities. Two localities (J7 and T4) contain skeletal remains in distant end-points of cave passages; one locality has a concentration of charred grain seeds and charcoal fragments (L5); and one of the spaces (E) shows clear ancient human modifications for its use, including the erection of short walls delineating different activity areas, and support walls overcoming sub-vertical steps connecting this space with neighboring spaces. These types of human modification were observed in many parts of the cave, but not in the immediate vicinity of burial locations.

2. In December 2017, in order to investigate various types of environments and land use within walking distance from the cave, a two-day surface survey was conducted in several sub-aerial survey units located within a few km's from the cave. This was conducted as part of an educational survey of the HU Institute of Archaeology, headed by Ido Wachtel (which was also one of the heads of the cave

survey). The survey units included the slope of Mt. Meron opposite Har Safsuf, and the environs of Har Sasa; both localities yielded large amounts of flint nodules, some of which were clearly used in antiquity, with significant components of production wastes of bifaces (axes and adzes), possibly dating to the Chalcolithic period. Finished bifaces are among the flint tools found inside the cave.

Material Culture Analysis

Pottery

Pottery analysis, conducted at the HU Institute of Archaeology, included quantitative typological scrutiny of the pottery assemblage, and a comparative investigation of the assemblage vis-à-vis supposedly synchronic assemblages from the Galilee and beyond. The ceramic assemblage comprises 100+ vessels (minimum number), and although it is only partly preserved (due to the high humidity in the cave, which resulted in disintegration of the ceramic material), it was already clear in the field that it is "early" within the Chalcolithic sequence, and appears to be the largest of this cultural phase in the mountainous Galilee.

The assemblage is characterized by uniform technology of rough manual design, a limited variety of types, and the application of slip in red-brown shades seen on most, if not all, vessels. The assemblage is dominated by three types – carinated bowls, bow-rim jars with slanted shoulders, and widening strap handles – all of which are represented by 20+ specimens. Both carinated bowls and bow-rim jars are late versions of typical sixth millennium BCE pottery shapes, and their appearance in the Har Safsuf Cave and contemporaneous assemblages mark the end stage of their manufacture. In addition, several rather unique types appear, including a cylindrical cup with straight sides and inner knobs; a multi-handled deep open vessel; and a double-handle of a churn. The presence of churn handles in the assemblage is especially noteworthy, as this chronological phase probably marks the beginning of churning (at least in ceramic vessels), with its obvious implications with regard to the introduction of "secondary products". Several other typological traits within the Har Safsuf Cave assemblage are also forerunners of types that will become much more common in Late Chalcolithic assemblages, e.g. v-shaped bowls, handles with triangular sections and pierced handles.

The ceramic assemblage finds its best parallels in the chrono-stratigraphic stages locally known as Horvat Uza 17-16, which predate the well-known Ghassulian culture of the Late Chalcolithic, and that should be dated roughly to the late sixth-early fifth millennium BCE (see dating section below). All assemblages known to-date from other sites are rather small and highly fragmented, thus the publication of the Har Sifsof Cave assemblage ix expected to make a significant contribution to the understanding of regional cultural trajectories within the 6th-5th millennia BCE.

Flint

The lithic assemblage in the cave is divided into two main components: 1) finished tools (and several other carefully-shaped blades), which include sickle blades, knives and bifaces, which were collected sporadically in various segments of the cave and almost entirely did not form concentrations of multiple specimens; 2) a large concentration (500+) of flint wastes that was found in one corner of the large hall in the eighth wing of the cave, in an area draining winter flows and drip water. It is not clear whether this concentration, and related items washed down in lower levels of the right wing, represents knapping activity within the cave, or lithics from the surface above from cave that are washed into the cave in this particular area through narrow shafts which enable sediment penetration. The sickle blades from the cave include two groups: (i) wide rectangular backed blades made from off-white raw material (sometimes with fossils), with typical rectangular cross-section, straight truncations, and abrupt to semi-abrupt retouch; (ii) narrow rectangular

backed blades with typically triangular cross-section, straight truncations, and abrupt to semi-abrupt retouch, the latter located near the maximal width of the "blank". On both types, the active edge bears no retouch, or is sometimes nibbled. It is not clear whether the differences between these two groups reflect regional (synchronic) or chronological (diachronic) changes, a change of region or a chronological change. It should be noted, however, that wider sickle blades are more common in northern areas of the Southern Levant in both "early" (i.e., pre-Ghassulian) and Ghassulian-Golanian phases.

Stone Vessels and Small Finds

Ca. 15 stone vessels were recovered from the cave, all made from basalt (locally exposed in Dalton Heights, ca. 2km east of the cave). The small assemblage included two large and heavy lower grinding stones that were hidden in two narrow squeezes inside the cave, in addition to several other fragments as well as pounding stones and processors. The most impressive finds were two chalices with rounded bowls and solid bases, a rather rare type in Chalcolithic assemblages with few parallels in Northern Valleys' sites such as Tel Dan. Additional finds include four bone awls or points, as well as a number of beads made from different raw materials.

Ecofactual Remains

Along with the material finds, the most prominent feature in the cave are the concentrations of charred plant material. Such concentrations, which typically comprise charcoal fragments, were found in numerous spaces, with specifically large concentrations located in several spaces in the left wing of the cave (e.g., space E). However, in area L5, of the large hall in the eighth wing of the cave, a large (100s-1000s) concentration of charred grain seeds (as yet unidentified), were encountered, excavated and radiometrically dated (below). It appears that at least some of the charred remains mark the location of ancient fireplaces and/or food processing areas.

Dating

Three samples, two from skeletal remains and one from charred grain seeds, were taken for radiocarbon dating. The results corroborate the typo-technological observations of the artifactual assemblages, and place the main activity in the cave within the first quarter of the fifth millennium BCE. A single date from the early sixth millennium BCE from one of the human bones, is currently lacking clear artifactual context, but may suggest that mortuary-related activities in the cave began as early as the Pottery Neolithic period. Such a possibility, however, needs to be corroborated by more dates from other samples.

Planned Research for 2018-2019

The preliminary results of material, ecofactual and skeletal analysis clearly reflect the significance of the Har Safsuf Cave for delineating regional cultural trajectories in the later prehistory of the southern Levant, as well as the development of mortuary rites associated with deep, complex caves. In order to better our understanding of these issues, several complementary avenues of research are planned for the coming year:

1. A two-week excavation season in the cave, seeking to tackle three main open questions: (i): what was the nature of human activity in the main areas of the cave, with three main hypotheses seem possible – habitation, ritual, or refuge; (ii) what is the significant (and context) of the appearance of concentrations of human bones associated with large material assemblages, vis-à-vis the deep burials excavated in the first season; (iii) what types of post-depositional processes (e.g., sedimentation,

gravitational movement, tectonic collapse) affect the anthropogenic accumulations, and to what extent are the latter deformed.

2. Continued analysis of artifactual and ecofactual remains, with specific emphasis on botanic remains and animal bones.

3. Additional dating of both charred plant material and human skeletal remains from different segments of the cave, in order to establish their chronological relations.

The results of these research components are essential for a holistic and comprehensive interpretation of the Har Safsuf Cave within its cultural setting, and will be combined with those already gained in order to promote the publication of this fascinating cave, currently planned to appear in two articles in high-impact peer-reviewed journals.

E4 193 198


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5
10 cm
Photo: Tal Rogovski


155/8
155/8
155-8
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EXCAVATION REPORTS
PE' QUIN CAVE

Excavation Report on Pe'quin cave: pilot study for the Dan David Foundation, 2017

In collaboration with Omry Barzilai[1]

[1] Excavations, Survey & Research Department, Israel Antiquities Authority,

PO Box 586, Jerusalem 91004, Israel

Introduction

In the last week of October 2017, we entered the burial cave at Peqi'in, Upper Galilee, for the purpose of considering future excavations and estimating the needs for a possible project. A thorough survey of the remains revealed that many finds, including a large amount of burials, remain in the cave either in areas that had not previously been excavated or in areas where only surface finds have been collected. Moreover, as the cave had undergone tectonic events, there may be hidden finds covered by flowstone, and the original entrance to the cave, has so far not been excavated.

About 200 ossuaries and burial jars, were found in the excavations conducted in 1995 (by Z. Gal, D. Shalem and H. Smithline on behalf of the Israel Antiquities Authority), several of them with unique plastic and painted anthropomorphic, zoomorphic- and geometric designs. Many other artifacts, typical to the Late Chalcolithic period (4500–3800 BC), were also uncovered, such as ceramic, copper, ivory and flint objects, witnessing about Galilean cultural characteristics on the one hand and connections to other areas in the country on the other hand. This extraordinary cave outstands also in the number of burials. In 1995, the estimated number of excavated individuals were 600. The cave, which was found by accident during a road construction, had completely changed the knowledge about the Late Chalcolithic period in the Galilee and enriched by far, the known symbolic designs of the period, not to mention the possibilities for research of its population.

The research and publication of the excavation and finds, as well as, new discoveries since then, created many questions about the Late Chalcolithic burial customs, culture and population. Therefore, after almost 23 years, we wish to start a new project of excavations in the cave. We are also convinced that nowadays, we will be able to cope with issues that we could not manage to solve in 1995, such as cutting the flowstone. These are our goals:

1. To get an accurate understanding of the amount of burials, where they were chosen to be placed according to gender and age, as well as family relationships.
2. Sample a large amount of bones from various areas in the cave for dating, in order to get accurate dates of the period during which the cave was used as a cemetery, and understand if all its areas were used simultaneously.
3. Uncover parts of the cave to fully understand how the cave was prepared for the placement of the burials.
4. Find more artifacts for a better understanding of their culture and its origin, by completing the assemblage of symbols and designs found in a single cave.
5. Find more artifacts for a better understanding of their relationships with other areas in the country.
6. Excavate the original entrance to the cave.
7. Further excavation may reveal unknown burials and finds covered by flowstone.
8. Enrich the knowledge about burial practices, such as the location of the finds related to the burials.
9. Enable future research of the population buried in the cave (DNA, family relations, diseases).

EXCAVATION REPORTS
TABUN CAVE

New Excavation at Tabun Cave
Report for 2017

In collaboration with Mina Weinstein-Evron[1] and Ron Shimelmitz[1]

[1] Zinman Institute of Archaeology, University of Haifa, Mount Carmel 3498838, Haifa, Israel

Introduction

Tabun Cave is located at the western edge of Mount Carmel, at the opening of Nahal Me'arot. It was first excavated between 1929 and 1934 by D.A.E. Garrod (Garrod and Bate, 1937). The total depth of sediments in the cave is 25 meters, in which Garrod divided the stratigraphical sequence into seven layers, ranging from the Lower Paleolithic to the late Middle Paleolithic. Three of these layers are attributed to the Middle Paleolithic, including Layer D, of the early Middle Paleolithic, Layer C, of the middle, Middle Paleolithic, and Layer B, of the late Middle Paleolithic. Each of these layers represents a different phase in the Levantine Middle Paleolithic (Shea, 2003; Hovers, 2009).

During the 1930's excavation, several human remains were retrieved from layers B and C. The most famous of this is C1 – the Neanderthal women that was found in the interface between layers C and B (McCown and Keith, 1939). While its attribution to a specific layer was left in question by Garrod (Garrod and Bate, 1937), it is most often assigned today to Layer B, (Bar-Yosef and Callander, 1999). Additional human remains were found within Layer B (McCown and Keith, 1939), including dental remains (Coppa et al., 2005). The finding of Neanderthals' remains in Layer B correlates with other sites dated to the late Middle Paleolithic, (Bar-Yosef et al., 1992; Hovers et al., 1995; Akazawa et al., 1999; Been et al., 2017). Nevertheless, the presence of *Homo sapiens* in Manot is also of note (Hershkovitz et al., 2015).

Since the 1930's, two other excavation expeditions at Tabun Cave were conducted. One by Arthur Jelinek between 1967 and 1971 (Jelinek et al., 1973; Jelinek, 1982), and the second by Avraham Ronen between 1975 and 2003 (Ronen et al., 2011). Ronen excavated the Lower Paleolithic layers of the cave, while Jelinek excavated a 10-meter step section at the middle of the former section made by Garrod. Jelinek's section covered Garrod's Layers E-C, ranging from the Lower Paleolithic to the middle, Middle Paleolithic. Layer B was not included in Jelinek's trench and as such, this part of the cave was not excavated since 1934 despite its enormous significance. The potential of a new excavation is further echoed in that studies of aDNA from the last decade, hypothesize the Levantine late Middle Paleolithic, as the time and place of gene-flow between Neanderthals and *Homo sapiens* (Sankararaman et al., 2012; Kuhlwilm et al., 2016).

In 2017, a new excavation was initiated in Tabun Layer B by Mina Weinstein-Evron, Ron Shimelmitz and Israel Hershkovitz from the University of Haifa and Tel Aviv University. Through the excavation we aim to:

1. Better understand the stratigraphy of this part of the sequence, including its environment of deposition and post-depositional processes.
2. Provide for the first time a comprehensive chronological frame for this part of the stratigraphy using a variety of methods.
3. Reconstruct the paleoenvironment and human exploitation patterns using a set of studies of biotic remains.
4. Track anthropogenic signatures within the sediments such as the extent of fire use using micromorphology.
5. Identify patterns in material culture referring to cognition, landscape exploitation, site use and the transformation of socially-learned knowledge.
6. Attempt to provide a better context for the human remains found at the site in the 1930's in order to better understand the nature of interaction between Neanderthals and *Homo sapiens* during the late Middle Paleolithic.

The Excavation Team Includes:

Archaeobotany: Mina Weinstein Evron, Zinman Institute of Archaeology, University of Haifa.

Lithic technology: Ron Shimelmitz, Zinman Institute of Archaeology, University of Haifa.

Physical Anthropology: Israel Hershkovitz, Department of Anatomy and Anthropology, Tel Aviv University.

OSL dating: Norbert Mercier, Institut de Recherche sur les Archéomatériaux, Université Bordeaux Montaigne.

TL dating: Helene Valladas, Laboratore des Sciences du Climat & de l'Environment, Université Paris-Saclay, Gif Sur Yvette.

ESR dating: Mathieu Duval and Rainer Grün, Australian Research Centre for Human Evolution (ARCHE), Environmental Futures Research Institute (EFRI), Griffith University, Brisbane, Australia.

Fauna: Reuven Yeshurun and Meir Orbach, Zinman Institute of Archaeology, University of Haifa.

Microfauna: Lior Weissbrod and Tal Fried, Zinman Institute of Archaeology, University of Haifa.

Isotopic analysis: Julia Lee-Thorpe, Research Laboratory for Archaeology & the History of Art, School of Archaeology, University of Oxford.

Micromorphology: Ruth Shahack-Gross, Department of Maritime Civilization, University of Haifa and David Friesem, Zinman Institute of Archaeology, University of Haifa.

Use-wear: Iris Groman-Yaroslavski, Use-Wear Analysis Laboratory, Zinman Institute of Archaeology, University of Haifa.

Tephra analysis: Dustin White, Department of Geography, Royal Holloway, University of London.

Phytoliths: Dan Cabanes, Department of Archaeology, Rutgers the State University of New Jersey.

Charcoals: Valentina Caracuta, Università del Salento.

(Additional experts will join the project)

Location of the Excavation and the Setting of a New Grid

The new excavations at Tabun Cave, focuses on Layer B and its transition to the underling Layer C. The eastern part of the inner room (Fig. 1), which was not excavated since 1934, constitutes the locality of the new excavation. In order to protect the stepped section, we entered the cave from the chimney through a special ladder that runs along ca. 13 meters from the plateau above the cave to the top of the sediments remained (Fig. 2). The ladder is attached to the wall of the cave and does not have any contact with the archaeological sediments. In order to maintain the safety of the excavation team, we fenced the border of the excavation and each excavator attended a working in height course (Fig. 3). A safety line was also constructed from the inner chamber to the opening of the cave below.

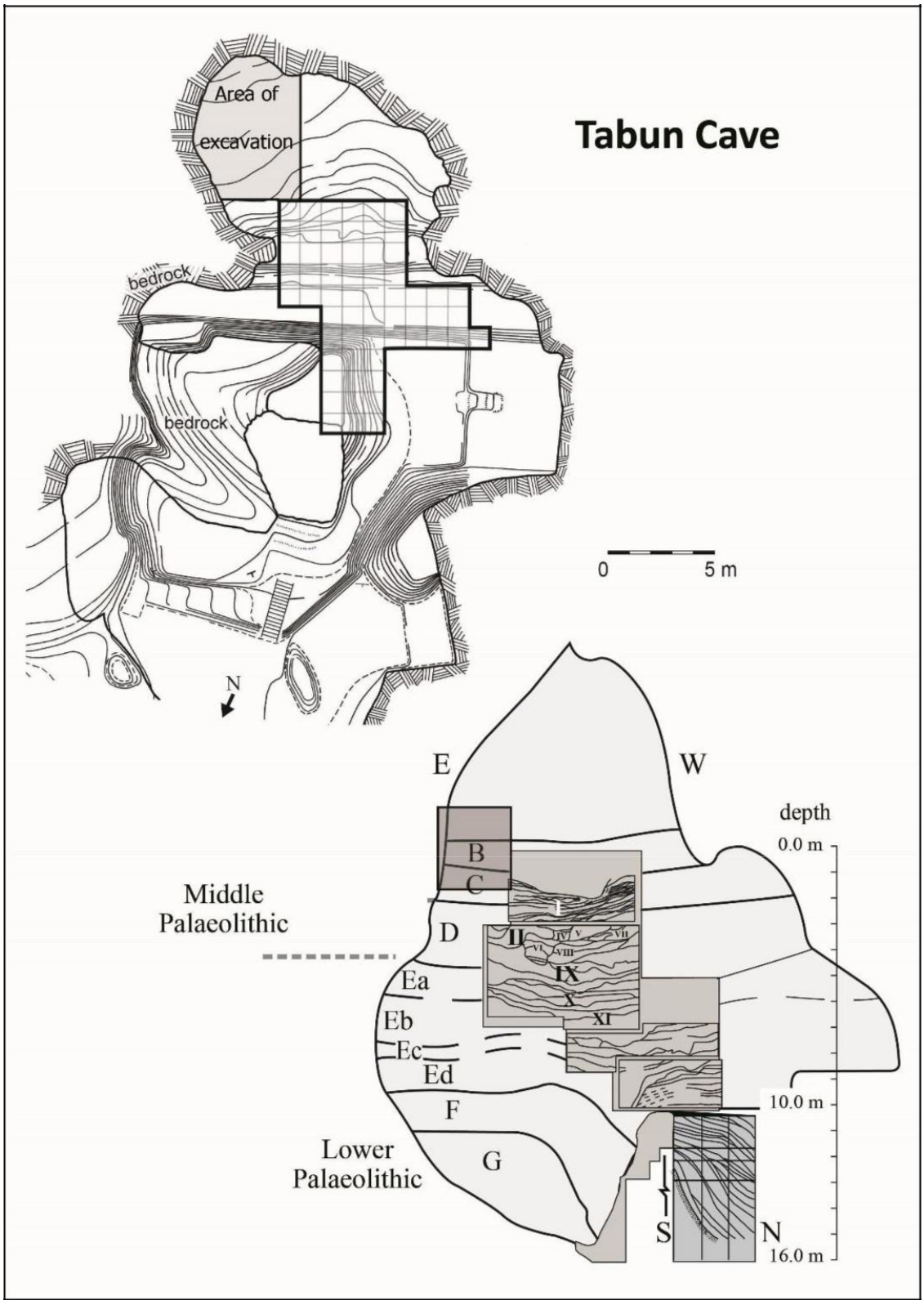

Fig. 1: Tabun Cave and the area of the new excavation (the main locality of former excavation by Jelinek and Ronen is marked as well).

Fig. 2: The entrance to the inner chamber that runs through a 13 meters ladder originating from the chimney's top at the plateau of Mount Carmel.

Garrod left at the end of her excavation at Tabun, a deep section composed of a set of steps running from the inner chamber to the external chamber (Fig. 3). In the inner room, a set of three close-by steps with small differences in elevation was made. Steps 1 and 2 of this stepped section did not preserve well and the sediments are inclining from the south to the north, creating a small talus with only minor portions of the very upper parts of Steps 1 and 2 remained intact. We have placed the safety net, which fences our excavation area, near the edge of Step 3. The visible remaining portions of the upper parts of steps 1-2 include: cemented sediments along the southern and eastern walls of the cave (Fig. 4). The erosion of the steps left by Garrod occurred through the exposure to rain following the end of excavation in 1934. A roof over the chimney was placed only in the late 1960's by A. Jelinek, which stopped the erosion of the steps in the inner chamber.

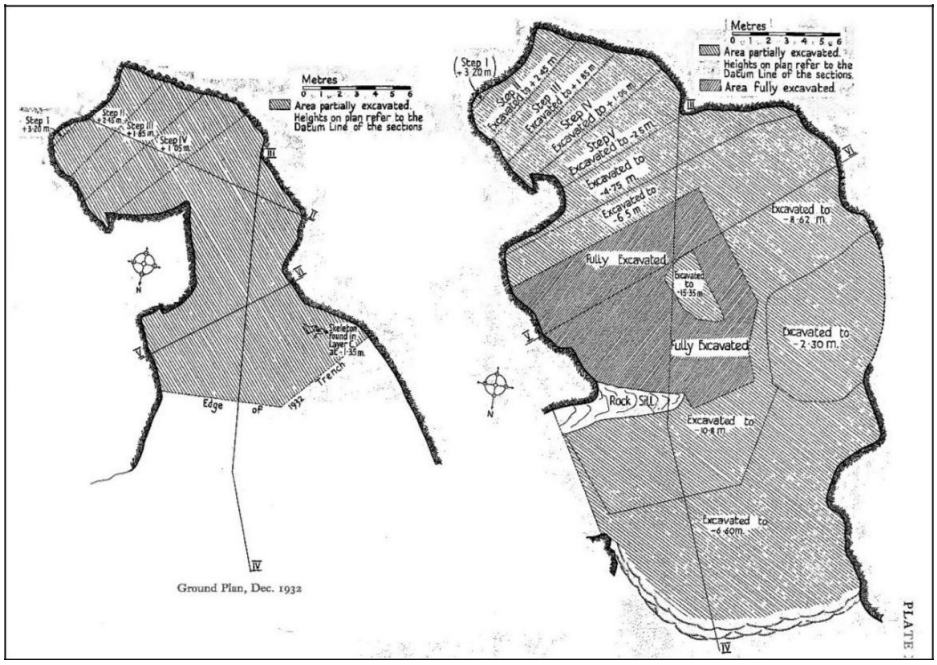

Fig. 3: The stepped section left by D.A.E. Garrod at the inner chamber at the end of the excavations in 1934 (After Garrod 1937: Pl.XXVIII).

Fig 4: The outline of our current grid (Sq. K-L/3-5) (photo towards east). Note the cemented sediments at the southern and eastern parts of the inner chamber, especially near the walls.

During the cleaning of the surface we identified a shallow tunnel, whose base was covered with a plastic sheet running along the eastern side of the inner room. We removed the eroded sediments that covered the plastic sheet and uncovered an irregular trench running through Step 2 and Step 3 (Figs. 5-7). The locality of this trench fits the trench mentioned in Paul Goldberg's Ph.D. (Goldberg, 1973). The trench is ca. 50 wide and 20-50cm deep. The location of the finds retrieved from it, is yet unknown to us.

Fig. 5: The locality of the plastic sheet along the eastern wall. Note the artificial cavity in the cemented sediments at the southern part of the trench (photo towards east).

Fig. 6: The plastic sheet after removing the overlying sediments. It is assumed to have covered Goldberg's 1973 trench.

A preliminary short season of excavation was conducted between 28.2 to 5.3.2017, in which our grid and datum was set according to the two former excavations at the cave by Arthur Jelinek and Avraham Ronen. The new excavation area was defined at the intersection of Columns K and L and Rows 1-5. While we used a new labeling system for the excavation squares, it is structured on the coordinates of the former excavations. This was used since the system of square labeling from former excavations did not enable defining new squares as former squares were labeled in running numbers from 1 to almost 100 (Shimelmitz et al., 2014: Fig. 1). The new system enables us to define squares in areas left blank by the former excavations. The selected locality of excavation covers the area from the southern wall of the cave to the intermediate chamber. The surface at this locality inclines from south to north with the south at a height of ca. 3m above datum and north at 1.9m above datum (Fig. 7). In 2017 excavation was made at squares: K4, K5, L2 (a, b), L3, L4 and L5 (Fig. 4). The grid is not perfectly aligned towards the north, rather to the opening of the cave. In the photographs, the north arrow is aligned toward the northern part of the net and not towards the true north.

Fig. 7: The excavation area (photo towards east). Note the inclining nature of the sediments from south to north.

Excavation Methods and Recovery of Finds

Excavation was conducted by dividing each square meter into four sub-squares (50x50cm). All sediments were wet sieved through 1mm mesh and artifacts larger than 2cm were recorded with a total station providing three coordinates. Sediment samples were retrieved from each level of excavation and their locality was also recorded by the total station. Stones of various sizes that were recovered in high number in our excavation were drawn and their bottom and top elevations provided by the total station. Photogrammetry was used to record the surface of excavation at different stages of our season. Lithic artifacts were not washed in order to best preserve use wear and residue if present. Teeth identified in the field suitable for ESR dating, were accompanied by a sediment sample from the locality they were retrieved from to enable dosimetry. The sediments from a full sub-square from each spit were meticulously examined for charcoal remains.

The Excavation and the Archaeological Layers

Our excavation of the top layer was initiated during the short winter season in March. The unstable upper sediments were cleaned according to the excavation grid and material was wet sieved. The locality of the plastic sheet attributed to Goldberg's sediments trench was also cleaned, in which the sediments overlying the plastic sheet were only partly wet sieved (most were dried sieved as it is unclear to what extent they are eroded sediments from the cave or sediments from elsewhere that were intentionally placed on the plastic sheet to protect it). After removing the plastic sheet, it seems that the trench was extended into a full square just below the concentration of the cemented sediment (square J4 in our grid), which probably represents some shallow testing pit. Following the cleaning, it was clear that the trench left by Jelinek's campaign, runs from a concentration of cemented sediment in the south, probably a portion of Garrod's Step 2 and into Garrod Step 3 (Fig. 8). In square J6 the trench was noted to go deeper into the lower part of Garrod's stepped section. As such, it was not cleaned in full rather covered again with plastic bags and a pile of stones on top of them. Similarly, the rest of the trench left By Jelinek's campaign was covered

by stones (a net sheet was placed at the bottom to signify its base) to prevent any further erosion of this locality. The stones used originated from the excavation and accumulated during the season.

Fig. 8: The trench left by Jelinek's campaign (photo towards south). Note also the extension into a full square at the area of square J6 in the new grid.

Between 18.7 and 7.8.2017, the first season of excavation at Tabun cave was performed. During this season, we excavated a depth of ca. 90cm at the south-eastern part (where the surface elevation was higher) and a depth of ca. 30cm at the north-western part (where the surface elevation was lower). Excavation stopped at an elevation of 1.55m above datum (Fig. 9). Thus far, our excavation was conducted in six squares ($1m^2$) defined as K4, K5, L2, L3, L4 and L5. Within the excavated volume we identify three layers (Fig. 10).

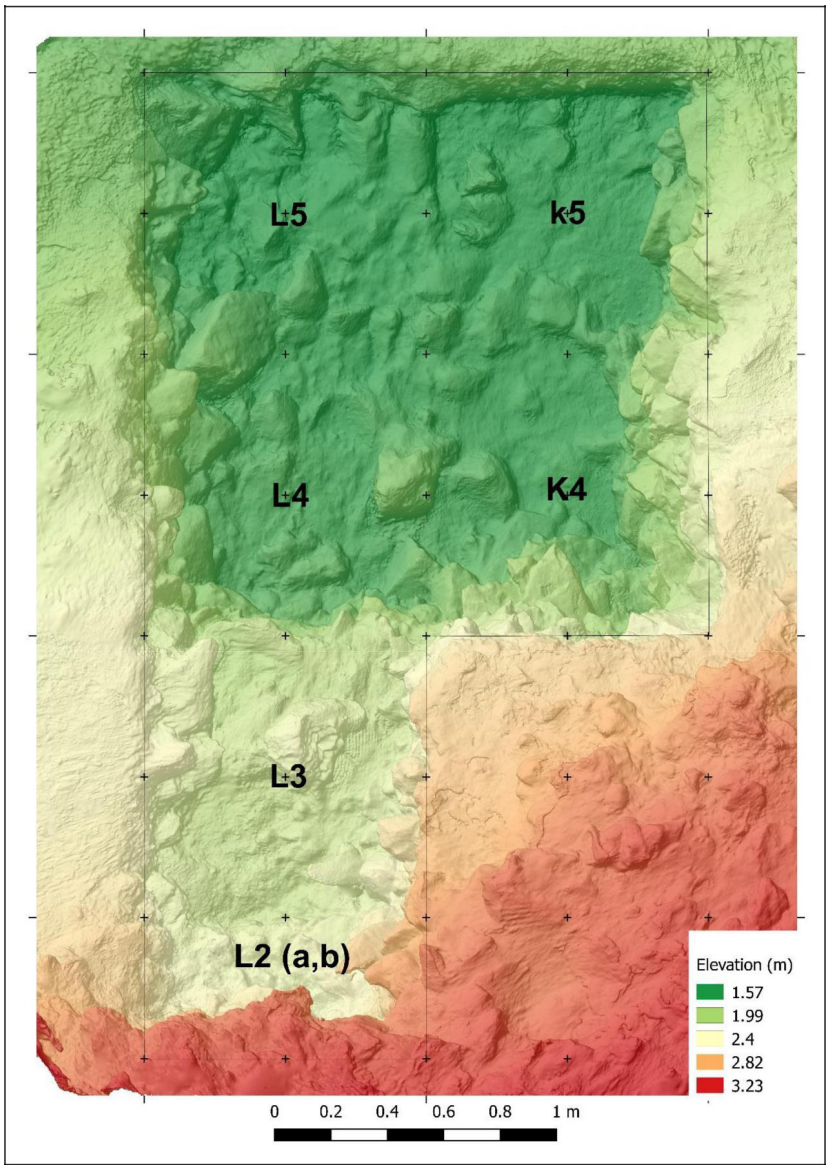

Fig. 9: Photogrammetric representation of heights at the end of the excavation. The reddish raster is the upper part of the cemented Layer I, which was yet unexcavated in 2017. Also note the many stones.

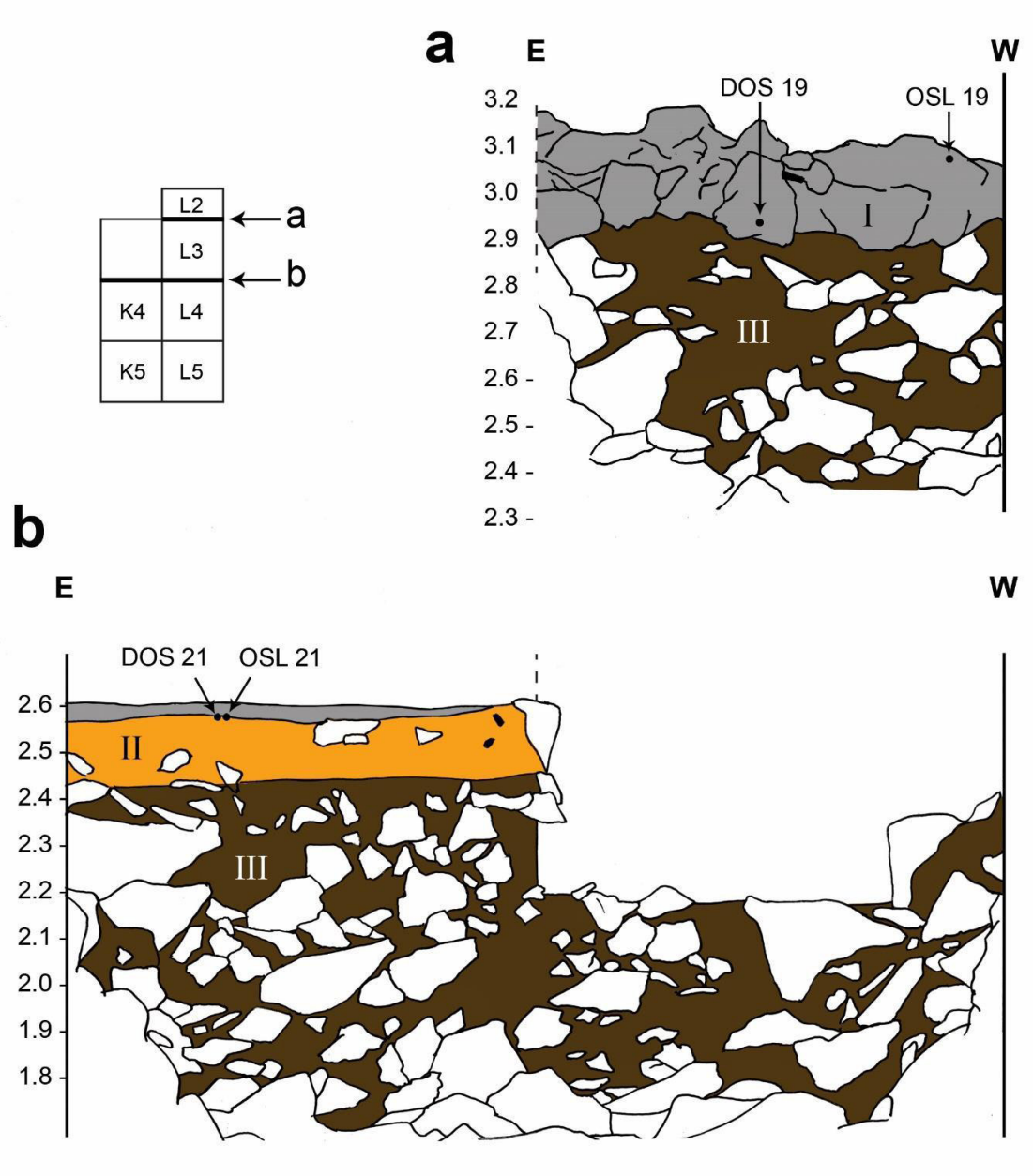

Fig. 10: Section, showing the three layers and the stony nature of the excavated volume.

Surface Layer:

The surface unit is ascribed to the disturbed sediments that cover this area of the cave (up to 10 cm in depth in the northern part). These sediments are not the original surface of the site, rather the mixed and loose sediments that represent the erosion of the very upper layer left following the end of Garrod's excavation in 1934. The current metal roof on the top of the chimney was placed only in the late 1960's and until then rain and water had damaged the sections left by Garrod. Very few modern debri were found in the inner chamber, mostly including, some metal pieces from the roof construction and its sets of rejuvenation in the last four decades. It is clear that very few people attended this locality of the cave since the earlier excavations by Garrod and Jelinek. The sediments are soft and were cleaned by a brush. Stones of various sizes (up to 30cm), were found loose on the surface (Fig. 11). Faunal material was frequent within the surface material, including both identified specimens and shaft fragments. Flint artifacts on the other hand were rare. The surface layer is only lightly spread along the cemented sediments and mostly spreads north to them along the current talus of the inner chamber.

Fig. 11: A view over the surface before excavation (photo towards east).

Layer I:

This layer is partly cemented and spreads along squares K1, K2, K3, L1 and L2 of our excavation area. It includes many stones in various sizes, as well as, a high density of faunal material (Fig. 12). Only a few lithics were observed in this layer. The layer, which is close to the cave walls, was not excavated in 2017. Its depth, according to the section made in L2 (a, b), just below the cemented sediments (Fig. 10), is ca. 20-30cm and it inclines towards the north. Among the faunal material a mandibles of fallow deer and some bones in articulation were noted (Fig. 13).

Fig. 12: Layer I, with concentration of cemented sediments especially at the upper left. Loose sediments of the surface are also present. The loose bones were collected using a total station.

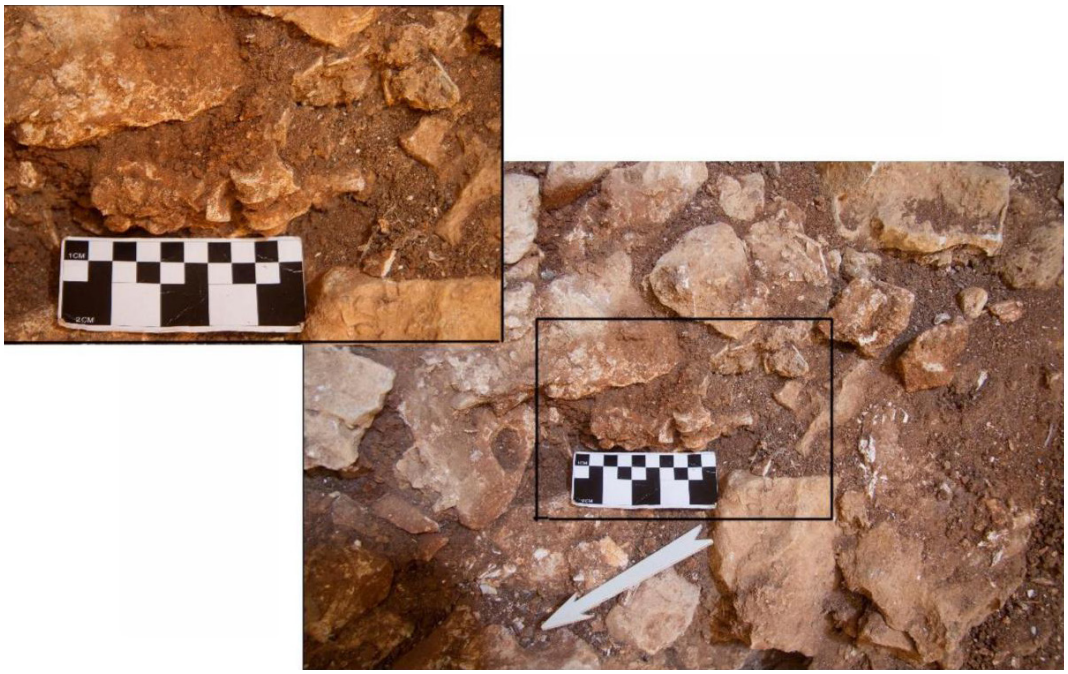

Fig. 13: Articulated bones within partially cemented sediments of Layer I (square J4: bones left as is in the field).

Layer II:

This layer is composed of soft sediments that are easily excavated. In most of the area of squares K4 and L4, it was encountered just a few centimeters below surface. The sediments are gray to light brown in color and include a high density of bones and several lithics as well. The layer is ca. 10-15cm thick, with an especially high representation in squares K4, L4 and L3. This layer also inclines towards the north. Microfauna is prevalent in this layer, in which a high concentration was especially characterizing square K4a, where a complete skull of a small mammal was also recovered. The sediments include a high presence of terra-rossa and they are crumbled into small chunks of 1-2cm in size. Stones of various sizes, ranging from few mm to 30cm are frequent within this layer (Figs. 14-15).

Fig. 14: Layer II in square L3. Note the high concentration of bones.

Fig. 15: Square L5 with the surface layer still present at the northern part and Layer II exposed below.

Fig. 16: Fine stratification within Layer II was found only at the southern wall of square K3. This particular area was characterized by less stones. Geological samples from this locality are in process (photo towards south).

Layer III:

This is a dark brown clay layer that includes many stones of various sizes within it. Its depth is still unclear. The finds in it include primarily bones, especially at the upper part, however stone tools and waste in small numbers were found as well. A clear decline in the amount of bones and lithics is witnessed in comparison to layers I-II. The numerous limestones in it are assumed to be the result of the partial collapse of the cave roof, which created the current massive chimney that is placed above the excavation area. While the process of the formation of the chimney started at the base of Unit I, (Layer C; Jelinek et al., 1973), the massive concentrations of stones suggest that a significant expansion of the chimney occurred during the time of Layer B. The sediments are darker and more compact than in the upper layers. During the excavation, the sediments are fragmented into large chunks. The density of stones increases, in comparison to layer II and stones are spread all over the area of excavation of Layer III, (Figs. 17-19). Thus, Layer III can be described as a "stony layer", probably reflecting an episode of a significant extension and collapse of the chimney, and less as a hominin living occupation. The finds predominantly include fragmented bones, mostly short shaft fragments, (a few cm's in size). Nevertheless, several large bones were found as well, such as a portion of a fallow deer mandible, (Fig. 20). Flint artifacts are rare, (Fig. 21). In square L3, several bones were found in articulation, identified in the field by Meir Orbach as gazelle. Several fallow dear bones were also found in this locality, as well as, a Levallois point (Fig. 22). There is some variation in the sediments, such as patches with less stones or patches with slightly more grayish sediments. In square L4, a concentration of the sediments was especially hardened at elevation 173. In squares L2 and L3, especially at elevations 230-220, dark patches were found to cover some of the stones – a geological sample was preserved.

Fig. 17: the upper part of Layer III (photo towards south) as exposed in 22.06.2017.

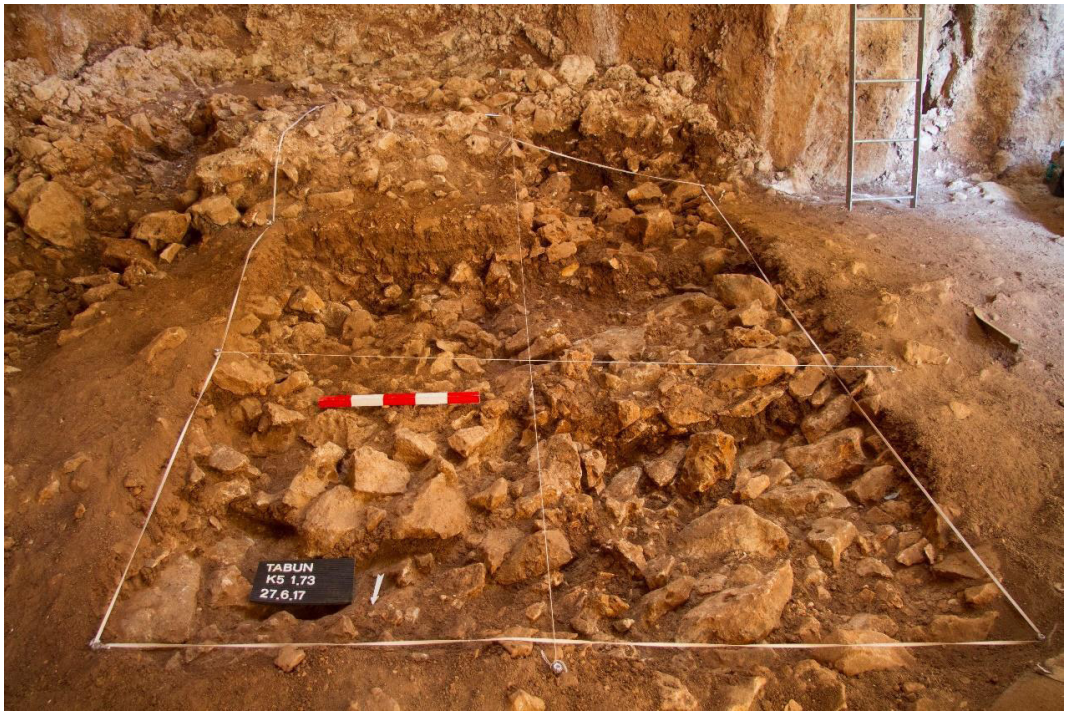

Fig. 18: Excavation of layer III (27.06.2017).

Fig. 19: Tabun Cave at the end of the first season of excavation, a view from the north. Note the many stones resulting from the partial collapse of the roof and chimney expansion.

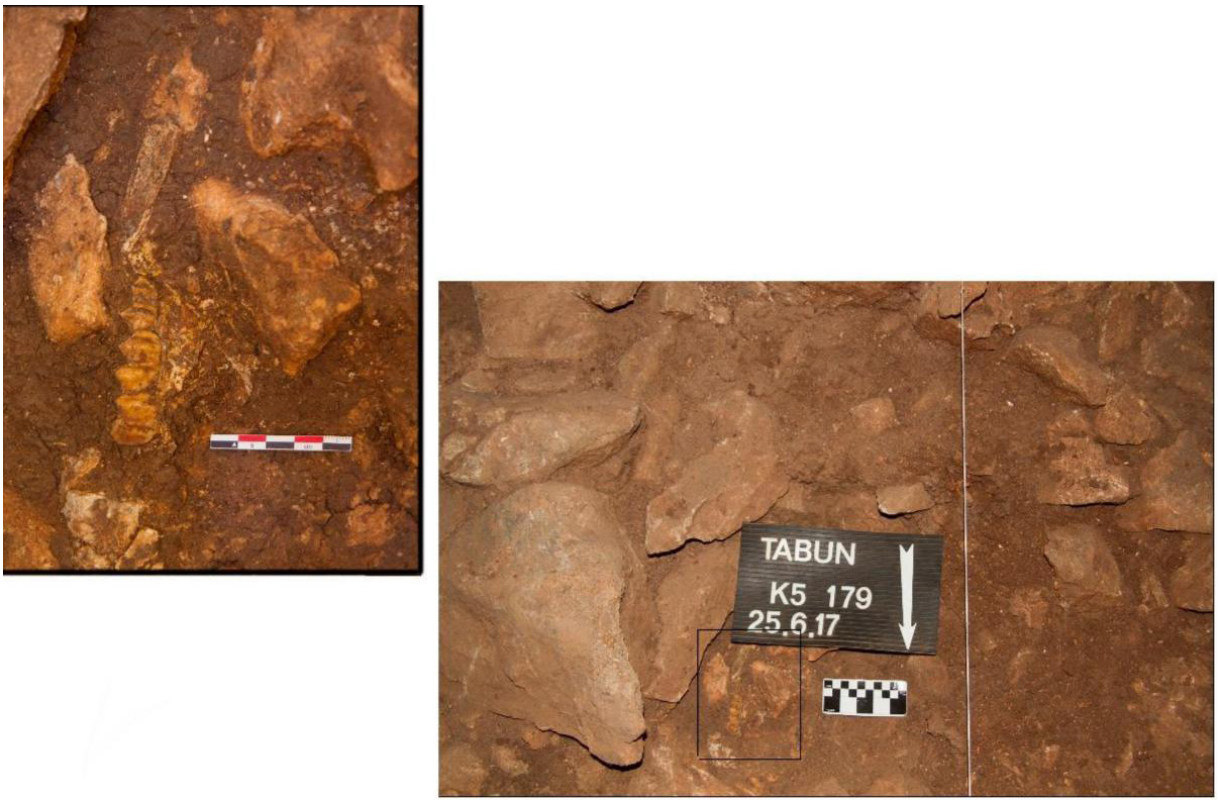

Fig. 20: A fallow deer mandible within layer III.

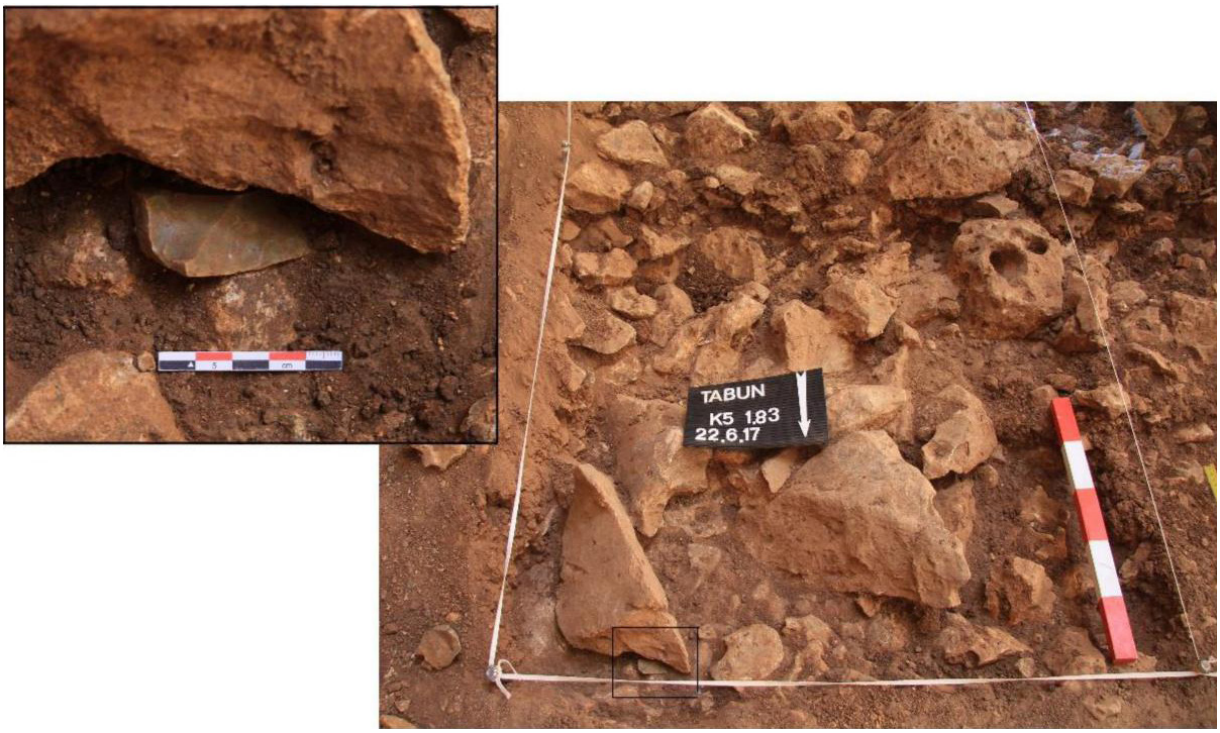

Fig. 21: Square K5. In this locality Layer III was found very close to the surface. The location of a flint scraper within this stony layer is noted.

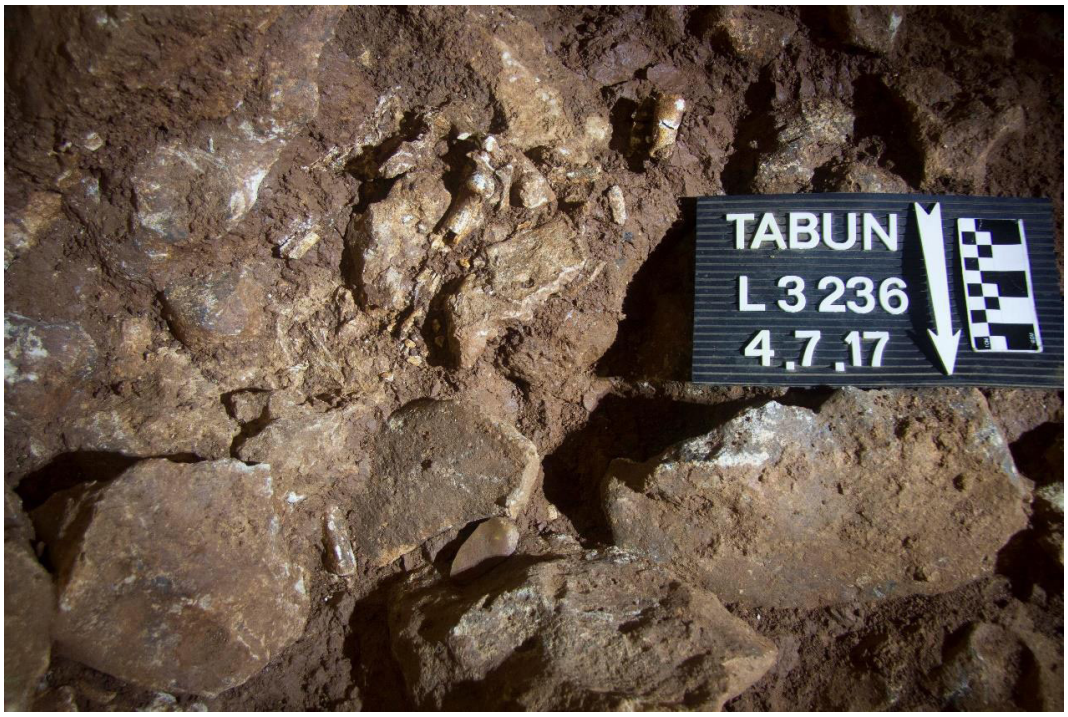

Fig. 22: A concertation of bones in Layer III, some in articulation. Also note the Levallois point at the northern part of the square.

Preliminary Results of Bulk Sediment Analysis

Six bulk sediment samples were collected from the new excavation area of Layer B in Tabun Cave (Table 1). Results of Fourier Transform Infrared (FTIR) spectroscopy analysis indicate that all sediments are mainly composed of unaltered clay (similar to the regional terra rossa), besides the top cemented sediment having calcite as the major mineral component. Very low amounts of calcite and dahllite (carbonated hydroxylapetite) were found in some of the sediments. The low amounts of dahllite could derive from the presence of bone fragments in the sediments. Based on this initial analysis, it could be suggested that the sediment have been deposited by colluvial transport of terra rossa into the cave through the chimney. The cemented layer at the top of the excavation area has been cemented due to relatively recent dripping from the cave walls and re-precipitation of calcite. No clear evidence was detected for the use of fire or for diagenesis of the sediments post-deposition.

Sample	Location	Sediment Description	Minerals
TBS 17–50	Layer III	Soft brown crumbly sediment	Cl(na)
TBS 17–51	Layer I	Whitish-brown sediment with many bones	Ca>Cl(na)>D
TBS 17–52	Layer III	Dark brown sediment	Cl(na)
TBS 17–53	Layer II	Brown crumbly sediment with grey laminations	Cl>>>Ca
TBS 17–54	Excavation surface	Dark brown crumbly sediment	Cl(na)>>Ca, D
TBS 17–55	Layer II	Powdery gray sediment	Cl(na)>>Ca

Table 1 – Infrared spectroscopy (FTIR) results. Cl= clay; (na)=non altered; Ca=calcite; D=dahllite.

Photogrammetry

During the excavation, we took sets of multiple pictures for creating 3D models using photogrammetry. These sets were taken on the 1st and 2nd of March, on the 19th, 20th, 21th, 22th, 24th, 25th, 26th, 27th, 29th of June and 2nd, 4th and 7th of July (Fig. 23).

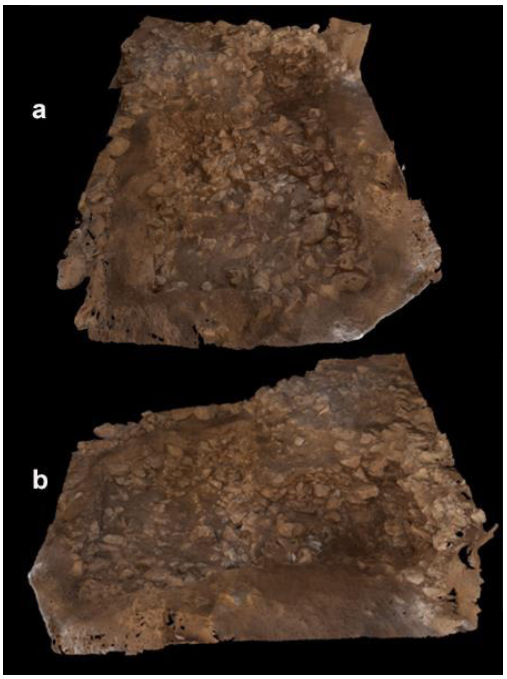

Fig. 23: Snapshots of the photogrammetry 3D model of the 07.07.2017, facing south (a) and east (b).

Preliminary Notes Regarding the Finds

The finds within the excavated layers include primarily animal bones. The most conspicuous species is the fallow deer (*Dama mesopotamica*), although gazelles are also well represented. Several of the bones were identified during the excavation to be in articulation. Another interesting observation is a protruding presence of young individuals. Stone tools (Figs. 24-25) and waste were found to some extent in all three layers, but are relatively few in comparison to the amount of bones. The lithic finds includes tools such as scrapers, as well as waste of production and cores. Microfauna is also well preserved within the sediments (Fig. 26). Shells of land snails were also found.

Fig. 24. Wide Levallois point from Layer I (L4; z=213).

Fig .25: A wide Levallois point and scrapers as found (kept with sediments for residue analysis).

Fig. 26: A concentration of microfauna (remains of pellets) found in Layer III (Sq. K4, z=196).

Dating Program

In 2017, dating was performed using Optically Stimulated Luminescence (OSL) of sediments (N. Mercier, University of Bordeaux Montaigne). Dosimeters that are essential for the calculation of the age were inserted into the sediments in close proximity to the place of each sediment sample taken for dating. The drilling of holes within the sections for the placement of the dosimeters was done during the day, while the actual taking of the sediment samples for dating, was conducted at night to avoid any solar radiation that distorts the OSL dating. The location of the three dating samples and dosimeters is provided in Tables 2-3. The samples are currently under analysis at the University of Bordeaux Montaigne. The background dosimeters will be extract in June 2018 for completing this part of the analysis.

OSL No.	Layer	Square and face	Z
Tabun OSL 19	ESH1	L2 south	3.02
Tabun OSL 20	ESH3	L2 south	2.75
Tabun OSL 21	ESH2	K4 south	2.58

Table 2: OSL samples from Tabun Cave.

Dosimeter no.	Layer	Z	Square and face	Lab number
Tabun dos. 19	ESH1	2.75	L2 east	
Tabun dos. 20	ESH3	2.93	L2 south	
Tabun dos. 21	ESH2	2.58	K3 south	

Table 3: Dosimeter placed at October 2017 at Tabun Cave.

Plans for 2018

Our work is in progress and we are still only at the vey upper part of Layer B. We are planning to continue the excavations at Tabun Cave Layer B in the next few years and further build our database for addressing the research questions at hand. The 2nd season of excavation, February 2018, has already been initiated at the time of the writing of the report. The goal is to further excavate, Layer B, particularly at squares K4, K5, L3, L4, L5, in order to better understand the lower part of the section and reconstruct the stratigraphy of the later part of the Middle Paleolithic sequence at this part of the cave.

Lithics are not abundant in the upper part of Layer B and their typological and technological analysis is in progress.

The geoarchaeological analysis is also under way and in addition to the samples that were retrieved this year, more samples will be taken as excavation continues.

While the dating program has already been initiated, more samples especially for TL and ESR exploiting burnt flint and animal teeth are planned to provide a better chronological control over the stratigraphy and the studied processes.

In reference to bioarchaeology: A range of studies will cover various aspects of the changing environment and human exploitation of it. While microfaunal analysis is already at work (L. Weissbrod and T. Fried; University of Haifa), large mammals from Tabun Layer B will also be subjected to a set of analyses, including documentation of the range of species and age profiles, as well as, a detailed taphonomic analysis of modifications due to anthropogenic, biogenic and geogenic impacts, (M. Orbach and R. Yeshurun; University of Haifa). Carbon and oxygen isotopic analysis, (J.A. Lee-Thorp; Oxford), is also planned and will

focus on animal teeth, which reflect the nature of the vegetation and humidity of the region. Botanical remains will be extracted from bulk samples, referring to phytoliths (D. Cabanes; Rutgers University) and charcoals (V. Caracuta).

The building of the database and its analysis are significant steps towards our goals, which include the identification of the specific behavioral patterns of Neanderthals and their adaptations patterns.

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