JRD

Jordan River Dureijat (JRD)

2015 Excavation Report

Excavation Permit Number – G/83-2015

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Table of Contents

INTRODUCTION

On its course southward out of the Hula Valley the Jordan River exposes geological layers ranging in age from the Pliocene to the Holocene (Belitzky 2002, 1987). A combination of volcanism, tectonic movement, and nearly 200 years of drainage operations created a unique setting. Here, sediments over one million-years-old containing many archaeological sites are visible on the banks of the river (Fig. 1).

The site of JRD was discovered during the massive drainage operation of the Jordan River in December 1999 (Sharon et al. 2002). The site was first observed in piles of sediment on the banks of the river some 1300m north of the Benot Ya'aqov Bridge (Fig.1c) and finds were collected from the piles on the east bank. In the summer of 2002, a survey was conducted to evaluate the damage of the drainage operation. During this survey, a test excavation of one square meter (Section 6-02) was dug on the east bank of the Jordan River. A full account of the results of the 2002 survey and test excavation was published (Marder et al. 2015). Please refer to this publication for details and data regarding past research at the site. For a description of the 2014 test excavation season at JRD please refer to the 2014 report submitted to the IAA June 2015.

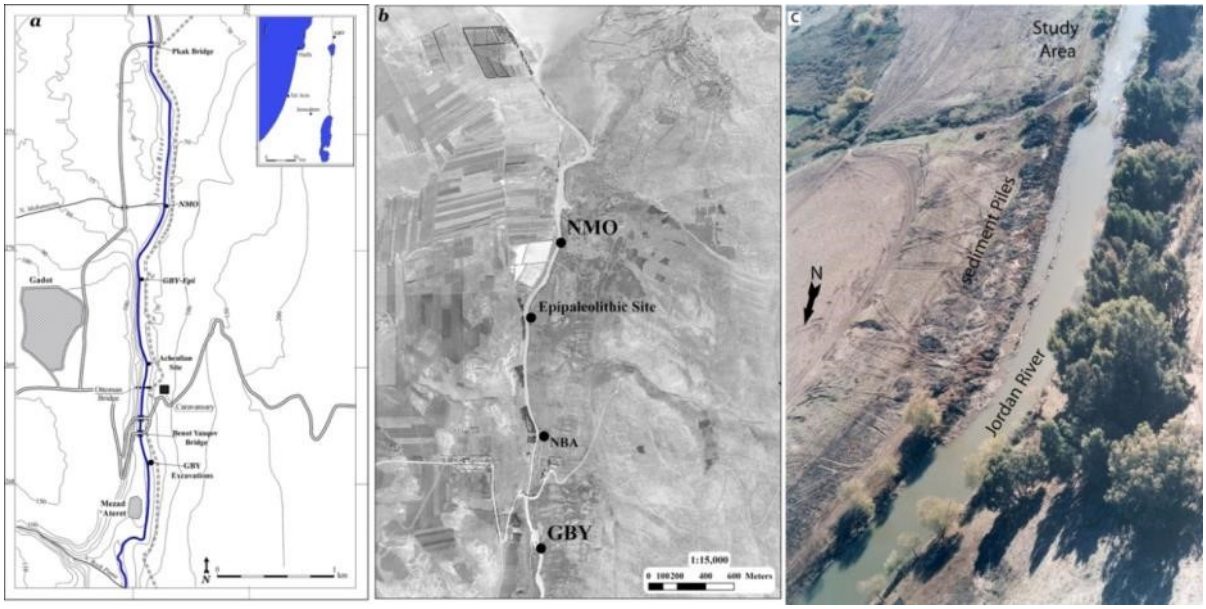

Figure 1: a. JRD location map; b. location of prehistoric sites on 1945 aerial photo; and c. view of the site during drainage work in 1999.

THE 2015 EXCAVATION SEASON

The 2015 excavation season at JRD took place between August 16 and September 10, 2015. Excavation permit – G-83/2015, renewal of permit G-65/2014. The team included some 35 students from the Tel Hai archaeological excavation field school (each participating in 2 excavation weeks) and volunteers from Sweden, Switzerland, Spain, Austria, Italy and, of course, Israel. The summer of 2015 was exceptionally hot and early in September an unusual sandstorm covered Israel for a few days. Excavation conditions were challenging.

The primary objective of the 2015 excavation season was to open a large surface area and begin excavation from the upper part of the sequence that was identified during the 2014 season after the removal of top, modern soil. We decided to locate the excavation at Area B of the 2014 season (Fig. 2). A 6 by 6 meter area was opened using a tractor that removed the upper meter of sediments to expose the archaeological layer.

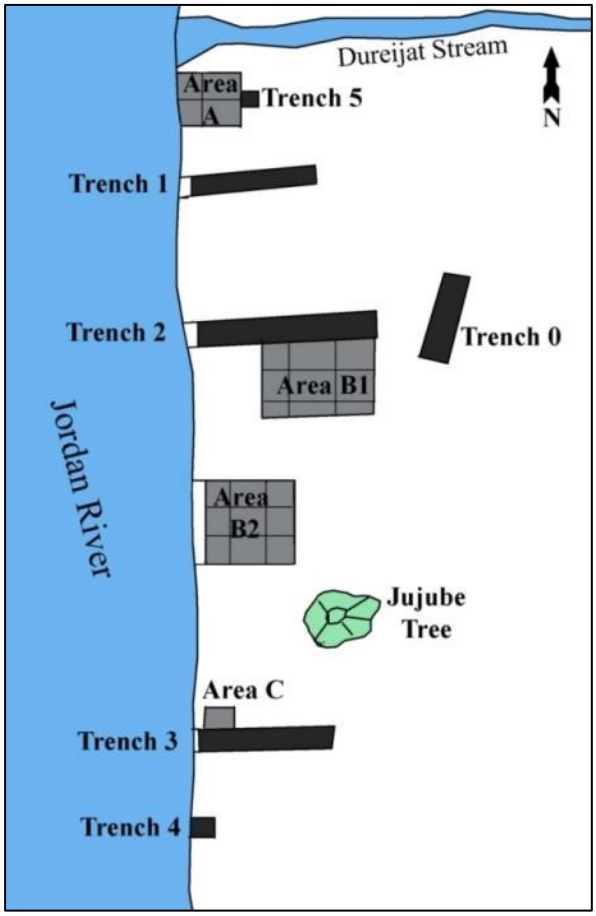

Figure 2: 2014 excavation map (not to scale). Area B of the 2015 season is located between Area B1 and Area B2

Figure 3: Area B1 2014 during excavation.

Excavation methodology

The aim of the 2015 excavation season was to expose a large surface area and attempt to reconstruct the spatial distribution and patterns of finds. The site was marked by a 1-square meter grid. Each square was subdivided into 4 50^2cm sub-squares. Each excavator was in charge of 1-square meter. The excavation was recorded by each of the excavators on a daily page (See Appendix 1). The excavation was executed in 5 cm spits and all finds were left in place and recorded in situ prior to removal from the square. Recording of the artifacts was done by Layca Total Station device where all finds larger than 3 cm are recorded. Smaller finds were collected into "general bags" sorted by material (flint, bone, botanic etc.). All soil samples and other important features were also recorded by the Total Station. All sediments were collected in buckets and sieved in the Jordan River using 0.2mm mesh sieves. In some cases, for example in layers sterile of finds, only a sample of sediments was collected. In most cases, sampling was of a single bucket per spit per square. Any sampling was noted in the daily excavation page. All daily pages are part of this report.

Area B – 2015 excavation

The objectives of the 2015 season were to expose a (relatively) large surface and to excavate beginning at the top archaeological layers (see section description below). To date, layers

bearing archaeological material have been uncovered from at least 50 meters of the river bank at JRD. The area most suitable for excavation was identified as being between the 2014 Area B1 and Area B2 (see Fig. 2) and further toward the east. The 2014 results indicated that the archaeological layers in Trench 2, immediately next to Area B1, are of good archaeological potential and can be stratigraphically connected to the layers exposed in Area B2. Area B2 was a small, 2-meter test excavation on the bank of the Jordan (Fig. 2) with good density of archaeological material and clear and interesting stratigraphy. The 2015 Area B was located between these two areas and toward the east. For more detailed description of the 2014 results please refer to the 2014 JRD IAA report.

The 2015 grid was based upon the 2014 total station resection points. For resection points data see the field notebook copy attached to this report. Resection using the 2014 points for the 2015 grid yielded excellent accuracy. An area of 6 by 6 meters was opened and gridded. Figure 4 shows the first sketch of Area B as drawn in the notebook and Fig. 5 presents Area B at the end of excavation season 2015.

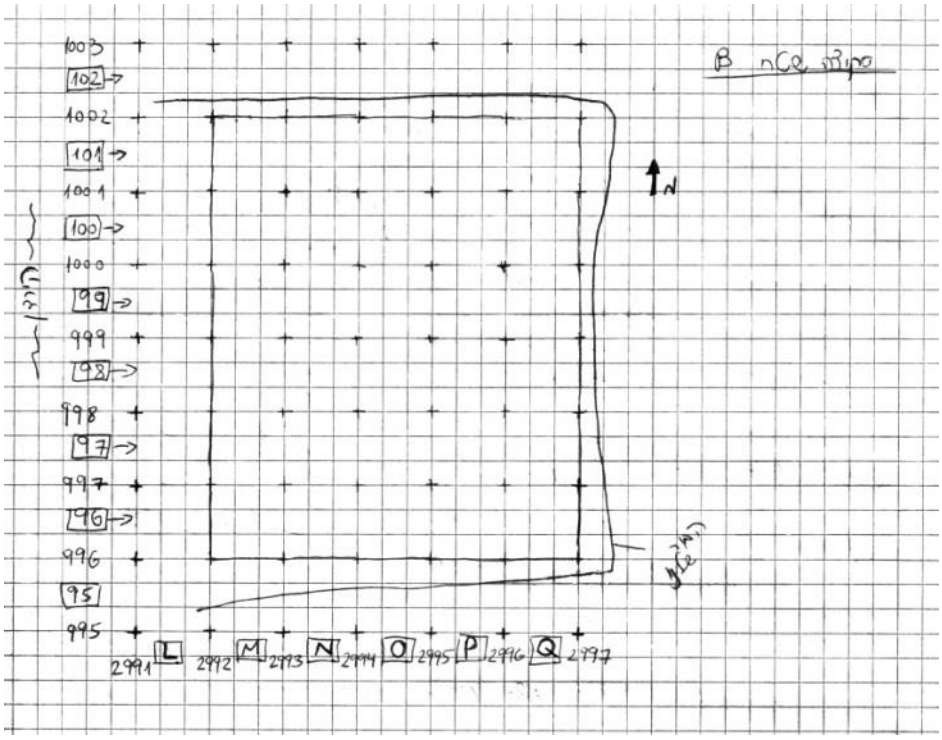

Figure 4: Area B 2015 opening map.

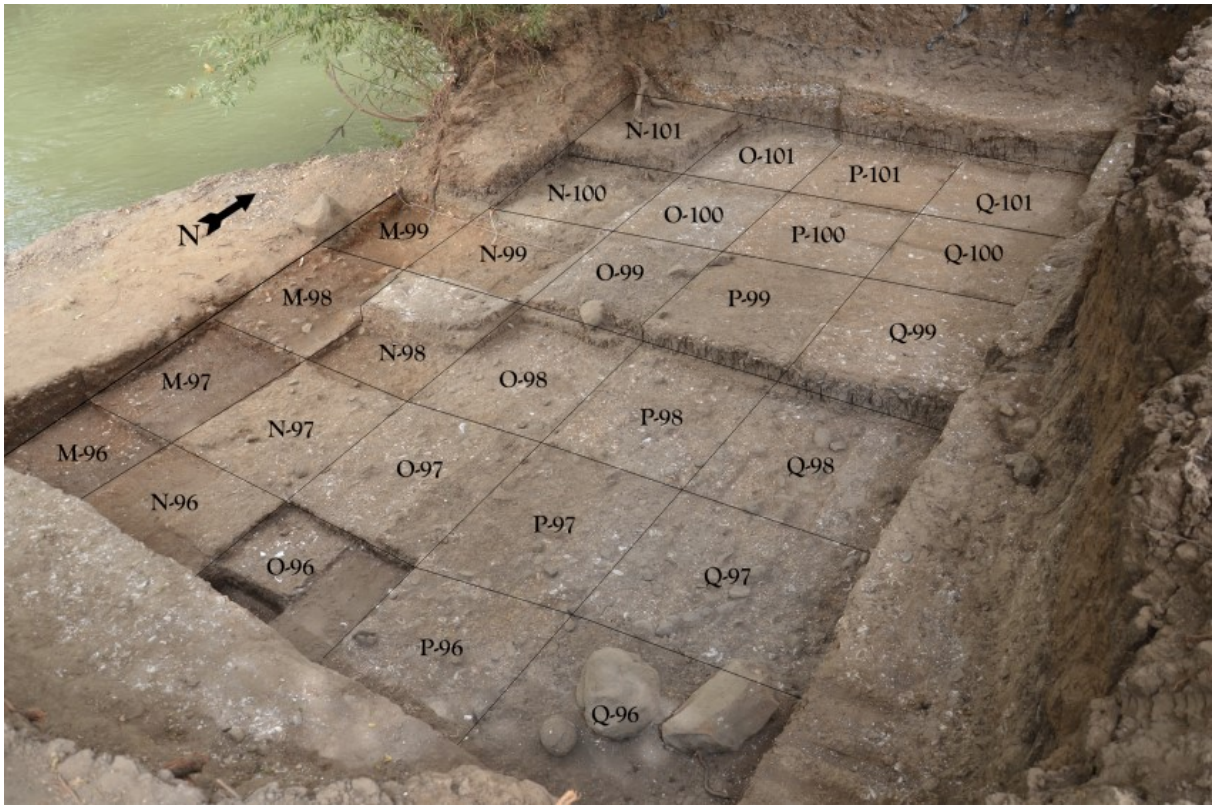

Figure 5: Area B 2015 end of excavation – grid and square names.

The first stage of the 2015 season was the removal of the upper layers comprising primary recent top soil, as revealed from the results of the 2014 season. The removal, using a JCB excavator, was stopped when the upper layers holding sand and mollusks were reached (Fig. 6). The depth of the tractor digging was set by the results of the 2014 test excavation and trenches. The upper layer of molluscs, later named sub-layer 3-0, was reached at a somewhat higher level than expected. As a result, this layer was not excavated and was mostly removed by the tractor (See below). In addition, the western squares of Area B (Line M squares) were either excavated during the 2014 season or were comprised of the modern Jordan River sand and mud laid in recent years (prior to the 1999 drainage operation). These squares were only cleaned and excavation began upon reaching the unexcavated layers (Fig. 6 c&d).

Figure 6: Opening Area B. Note the location of Area B2 of 2014 (c) and the removal of recent Jordan River sand from the west part of Area B (d).

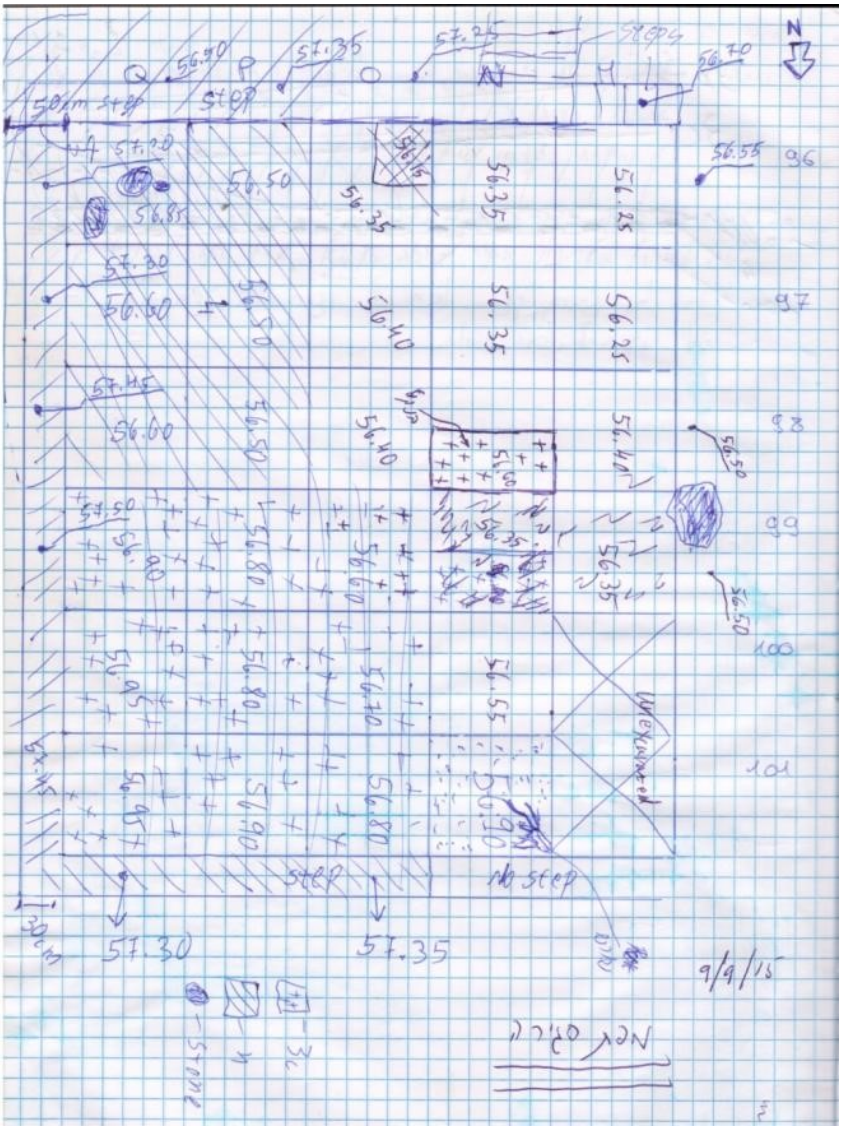

Figure 7: Closing map of Area B 2015. Final elevations are given for each square.

At the north section of Area B the excavated layer of 2014 Area B1 is clearly visible (Fig. 8). The excavated surface next to Trench 2 (2014) was covered by black nylon sheet which is clearly visible in Section north 2015 (Fig. 8). From the surface it seems that in the western squares, the 2014- B1 excavated surface scraped the top of layer 3-0 (see below) but did not penetrate deeper.

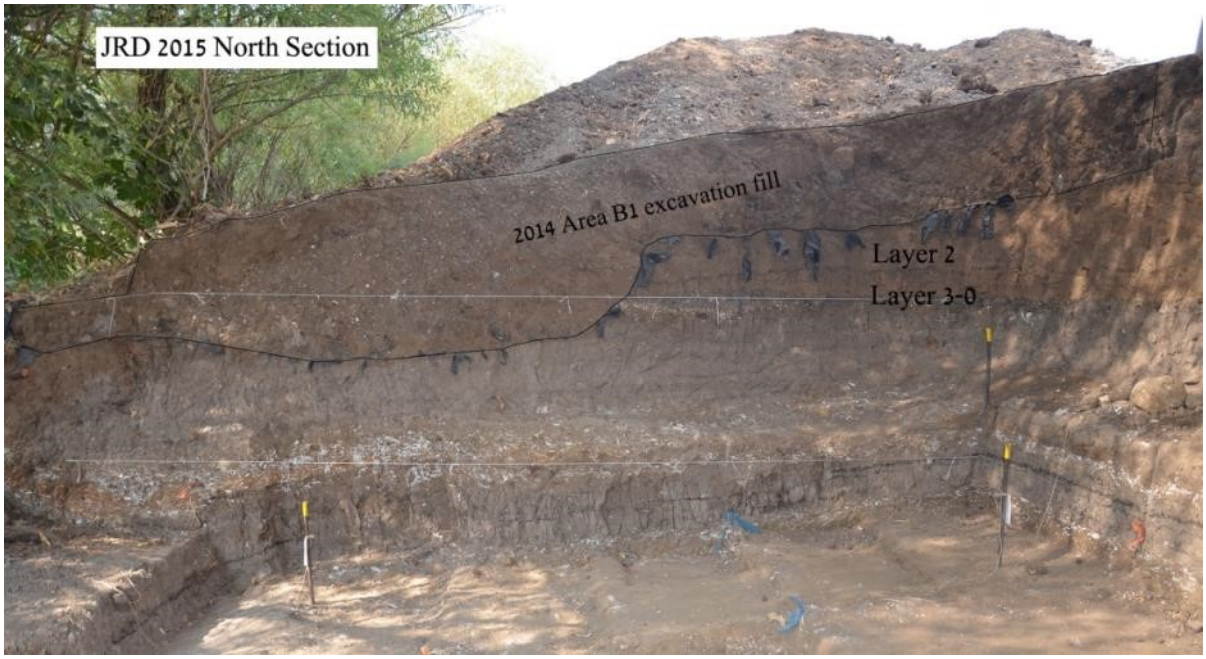

Figure 8: JRD Area B north section at the end of excavation. Note the fill covering Area B1 (2014)

The final stage of Area B 2015 is given in Figure 7. This map documents the final level in each of the squares and their status at the end of the 2015 season.

Area B 2015 general stratigraphy

This report will open with a general description of the stratigraphy of Area B as understood at the end of the 2015 excavation season. In the next stage, a detailed description of each layer will be given. The general stratigraphy of Area B 2015 as seen at the end of the season is given in Fig. 9 & 10 for the east section and 11 & 12 for the south section.

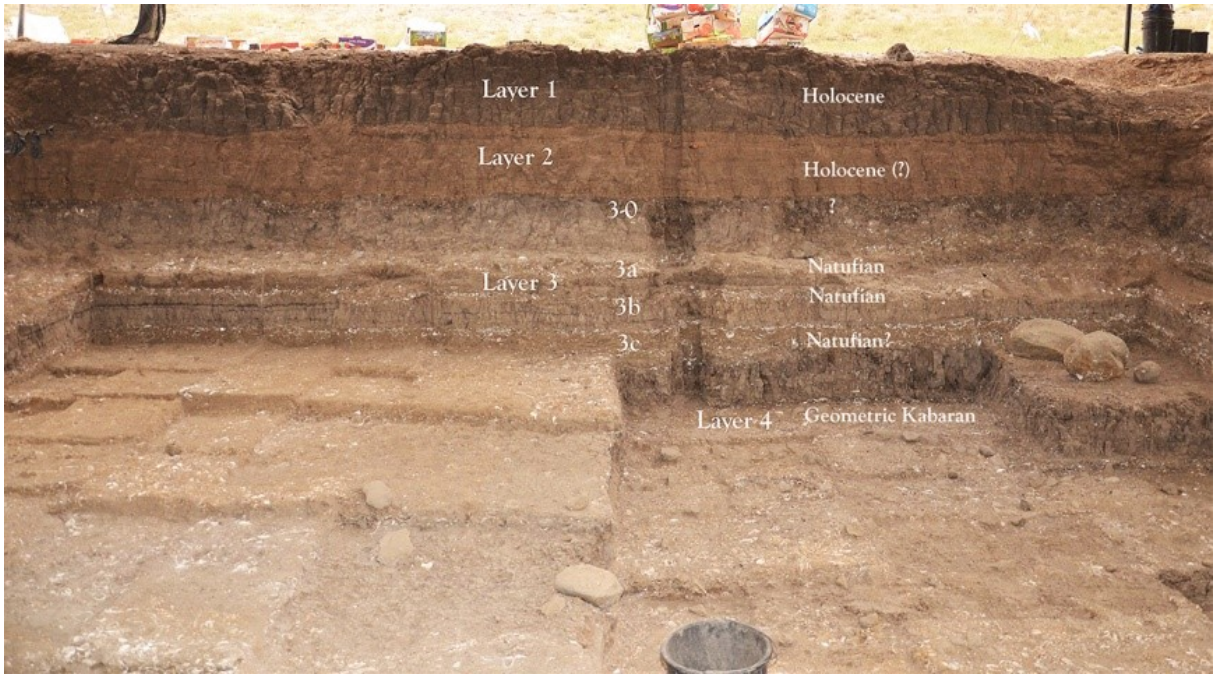

Figure 9: JRD Area B East Section - stratigraphy and cultural affinity.

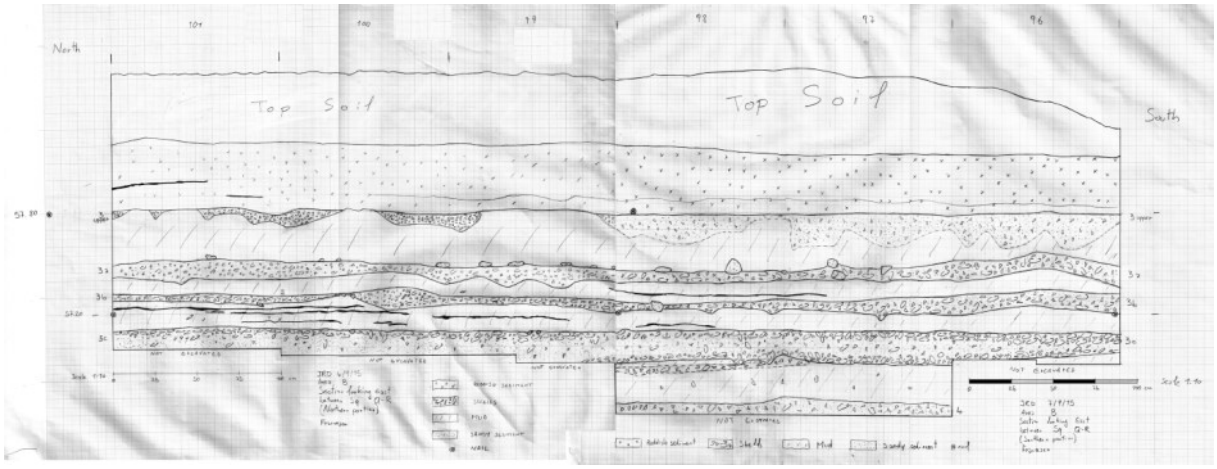

Figure 10: JRD Area B 2015 East Section drawing.

Figure 11: JRD Area B South Section – stratigraphy and cultural affinity.

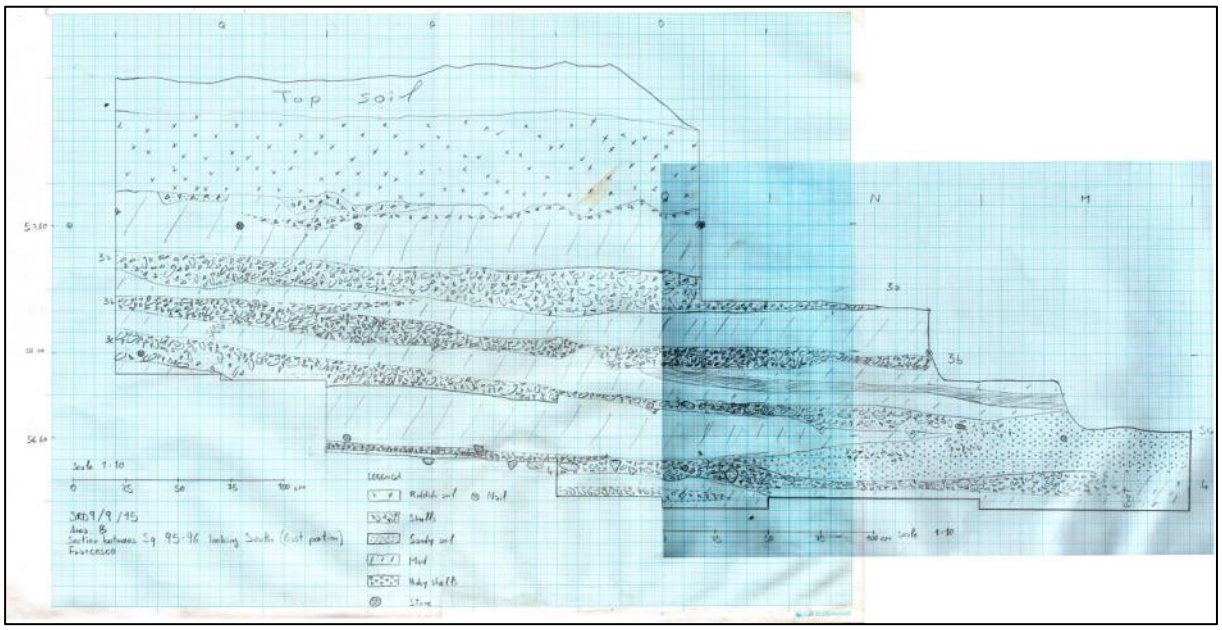

Figure 12: JRD Area B 2015 South Section drawing.

As can be seen, once the upper 2 layers were removed, the site's archaeological layers are formed as a (repeated?) sequence of mud and lake-shore horizons. It is suggested that the mud layers represent a high water stand in the Paleo-Hula Lake water-body while the sandy layers rich in molluscs were deposited in a lake margin environment. Naturally, the shore deposits are the ones containing the archaeological finds. Stratigraphically, we define each of the

relatively thin lake margin deposits as a layer (or sub-layer). The mud layer below this beach horizon is considered part of the above layer and is grouped under the same layer number. For example Layer 3b comprises the third sand and molluscs horizon within Layer 3 (Starting at Layer 3-0) and the 20 cm or so of mud below it. It ends with the appearance of the sandy horizon of Layer 3c (Fig. 15).

Area B Stratigraphy from Top

At the upper part of the Area B sequence are two layers, both of limmnic or perhaps swamp origin. The top 50 cm or so, Layer 1 (Fig. 13) are comprised of dark mud, probably of Holocene age and comprise the lower part of the soil covering the surface between the basaltic hills of the Golan to the east and the much older sediments exposed in the uplifted wall to the west of the site. This soil seems to form the sediment all along the artificial slope, rising a few meters to the east, formed by drainage activity (Fig. 13a). If this interpretation is correct then the part exposed in the Area B East Section is the lower part of a few meters of mud accumulation. It is possible that the soil accumulated in the slow floating river or swampy area formed by the Jordan River prior to the 1900's drainage operations. This area is located immediately north of the "basalt cork" and water floating was probably very slow prior to drainage. Figure 14 show an old map (map drawn in 1949 based upon a preexisting map) showing the Jordan River course south of the Hula Valley. The area north of JRD is marked as swamp.

Below the mud of Layer 1 is a reddish sandy Layer 2. Layer 1 and Layer 2 show a clear cut contact suggesting some king of rapid change in accumulation system. Layer 1 seems to cut Layer 2 which is ca. 50 cm of homogenous sand with no large shells or any evidence for human presence in the form of artifacts. This layer was probably accumulated in a slow floating river, possibly during the Holocene.

Figure 13: Area B East Section at the beginning of excavation. a. large scale stratigraphy and the possible affiliation of Layer 1 with the slope above it; b. close up.

Below the sandy Layer 2 is the uppermost lake-shore and molluscs horizon starting the "beach-mud circle" of Layer 3. This horizon, named Level 3-0, was identified and defined but not excavated. It was mostly removed by the tractor when opening Area B for excavation. It is a relatively thin, sandy horizon, rich with molluscs and it seems that it was cut by the upper Layer 2 forming an unconformity between these 2 layers (Figs. 13 & 15). Another aspect making layer 3-0 different from the lower beach/mud layers is that the molluscs/sand horizon is highly uneven in thickness and shows uneven contact with the mud below it (Fig. 15).

No significant finds were unearthed from Level 3-0 and it is impossible to determine its age. During the excavation season of 2016 additional excavation surface will be opened to the

north of Area B. Here we will expose and excavate a larger surface of Layer 3-0 and determine its nature and chronology.

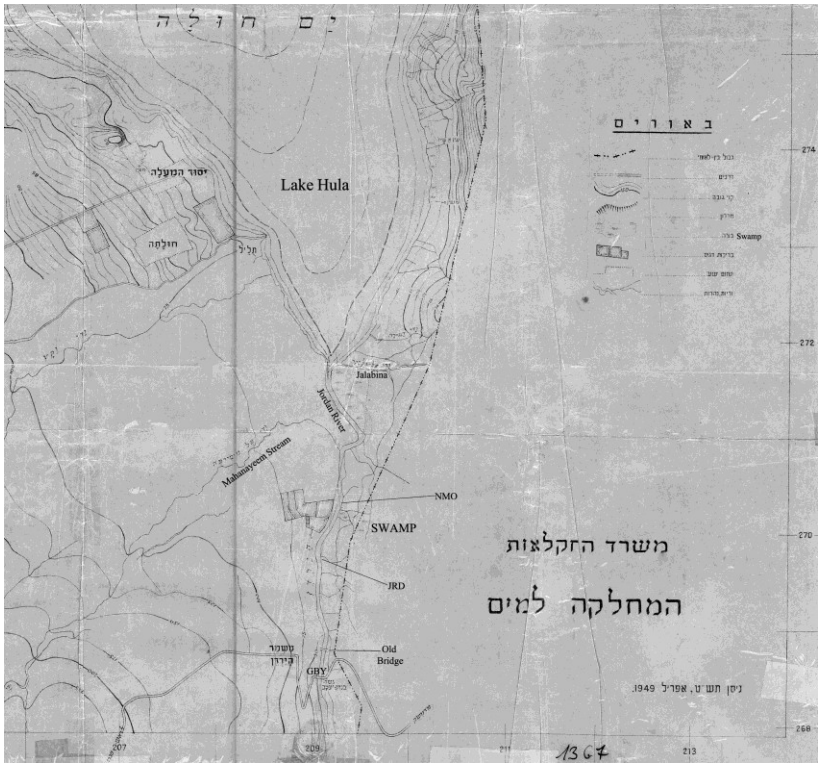

Figure 14: Irrigation map of the Jordan south of Lake Hula from 1949 (based on older map – note that the Ottoman bridge is still marked, the bridge was destroyed during the 1930's). The map indicates swamps north of JRD.

Figure 15: Stratigraphy of Area B East Section upper layers.

Level 3-0 marks the beginning of the stratigraphic sequence that forms the primary archaeological sequence of JRD. The lower meter of the exposed sequence is a series of lake margin deposits separated from each other by thicker layers of mud deposits. Layer 3 comprises 4 such horizons (Level 3-0 to Level 3c). Below it, Layer 4 is an additional such horizon and it seems that the deepest sub-square excavated during the 2014 season may have reached an additional such horizon (sub-square a in square O-96; Fig. 16 & see below). Each of these horizons is comprised of sandy to muddy sediment rich with molluscs shells and below it a thicker mud horizon with few shells and near absence of archaeological remains. It is suggested that this sequence represents changing water level in the water body next to which the site layers were formed. The shore deposits are comprised of grey sand with a wealth of molluscs. The primary two species forming most of the mollusc mass are Melanopsis and Unio. The shells change along the sequence in frequency and size. Some of the layers have exceptionally large shells, while in other horizons only miniature individuals appear (see mollusc discussion below). At the current state of research it can be argued that the difference in size and frequency of molluscs can be probably attributed to changing accumulation environments as well as to change in environmental conditions.

At the end of the 2015 season, 5 separated horizons were identified and a relatively large surface of the 4 lower horizons was excavated. The sequence is as follows:

- Upper horizon 3-0 was not excavated.
- Layer 3a is Natufian, yielding the richest occupation so far at the site.
- Layer 3b is also Natufian. Finds are scattered and the layer was excavated quickly.
- Layer 3c is possibly also Natufian due to the presence of Natufian looking sickle blades and bone tools.
- Layer 4, the lowest excavated layer during the 2014 season is assigned to the Middle Epipaleolithic Geometric Kebaran.

A detailed description of these layers, their nature and the finds is given below. It should be noted that this clear stratigraphy becomes more blurred at the western part of Area B. It is suggested that this part of the site saw more human activity as well as more water activity closer to the ancient shore line. The western part of the site is harder to reconstruct and understand.

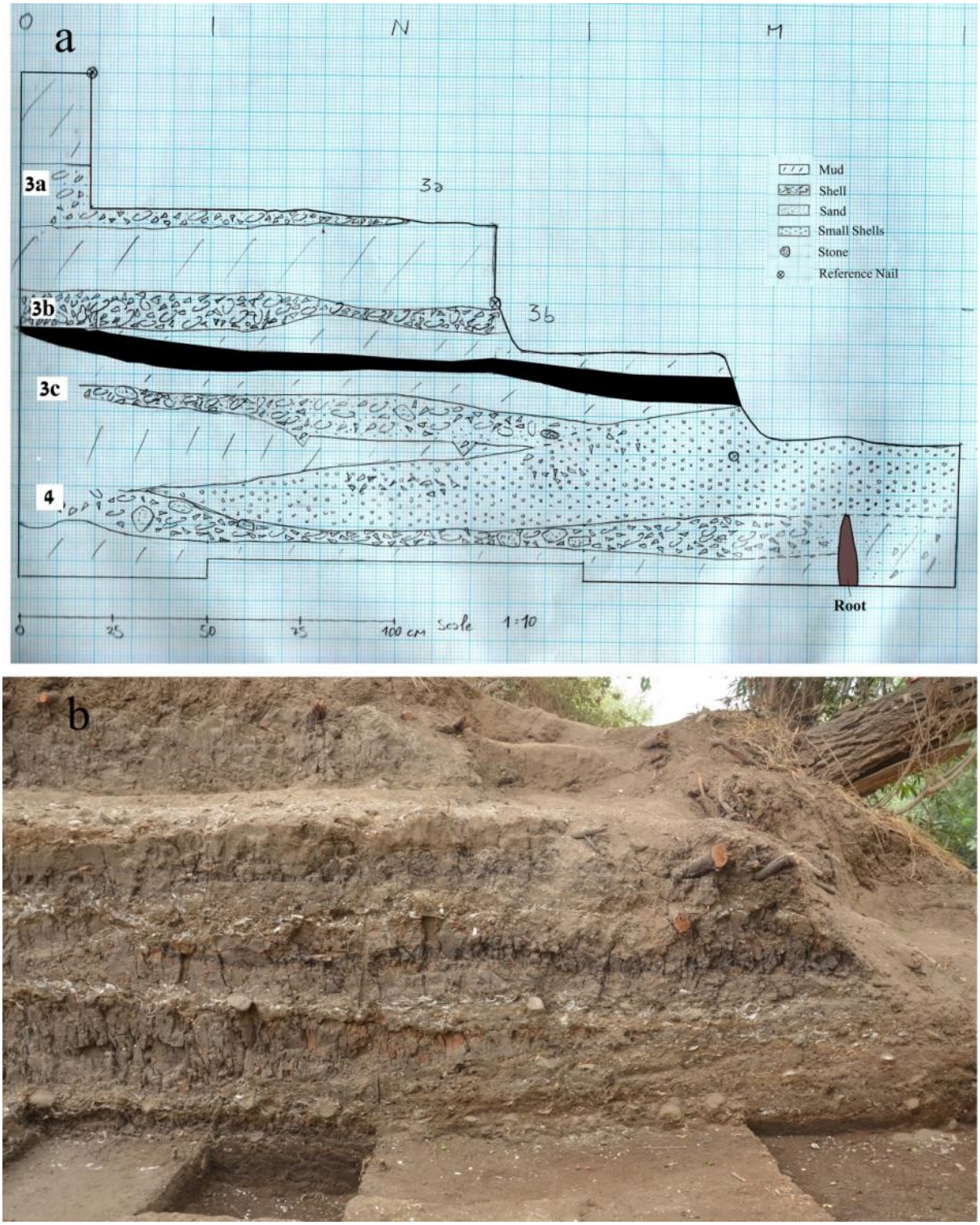

Figure 16: JRD 2015 Area B Section South. a. drawing of section's western part. b. photo. Note the changing layers toward the west.

Within the mud deposits between the coquina layers, all along the stratigraphic sequence, appear black horizons of clay (Figs. 16-19). In some cases the thickness of these horizons is only 1-2 cm. In other cases they are more than 10 cm in thickness (Fig. 16). These probably

represent changing conditions in the accumulation environment within the water body. It can be suggested that these are organically rich episodes of accumulations but geochemical tests need to be executed before the nature of these Horizons can be specified.

Figure 17: Black horizons within the 3b mud layer. Area B South Section.

Figure 18: Black horizon in Layer 3b mud. Square Q-101.

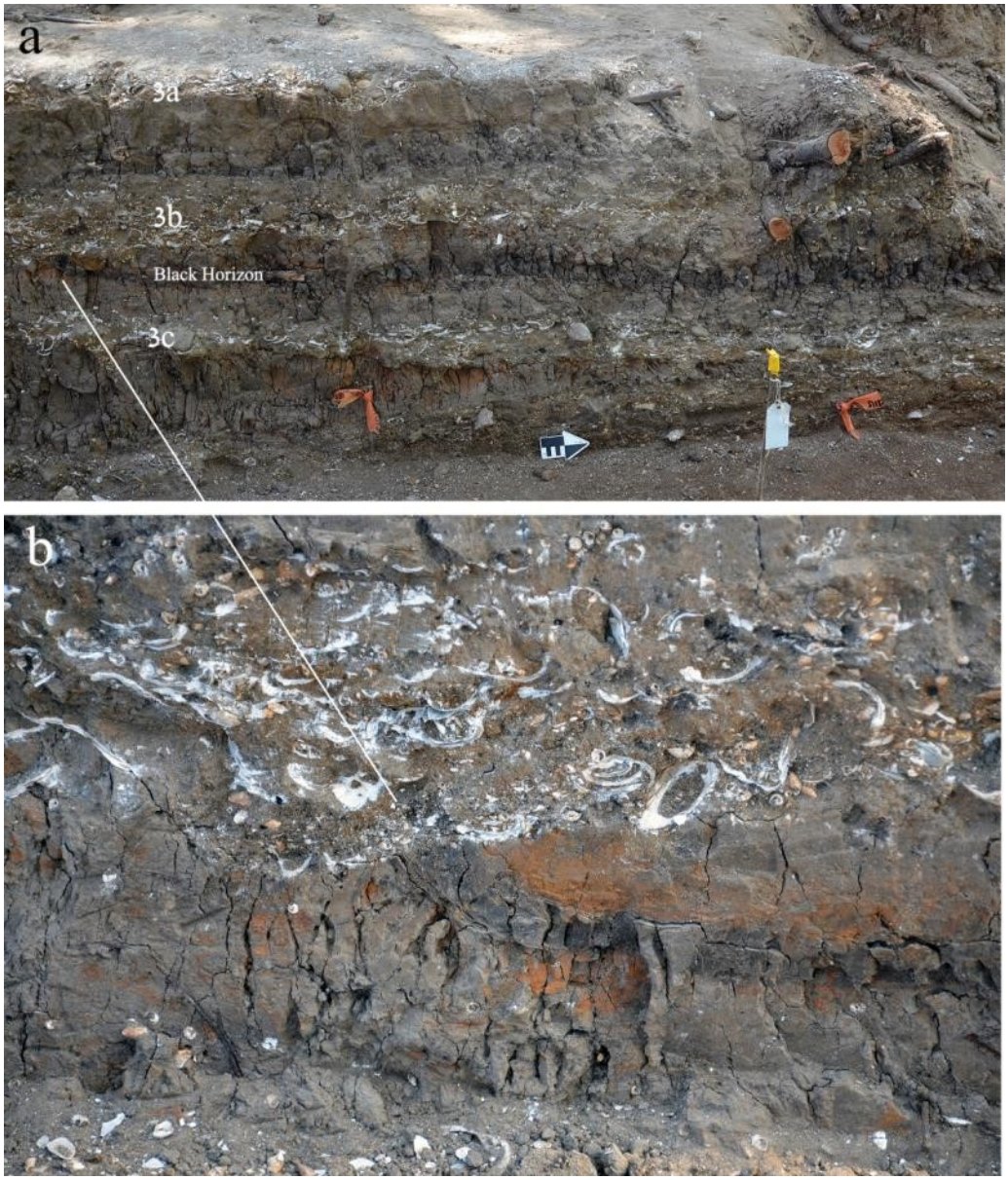

Figure 19: Thick black horizon in Level 3b mud. South Section. b. close-up showing 3b horizon cutting the black horizon. Note the uprising of the black horizon.

Level 3a

This is the uppermost layer excavated at JRD. At the primary part of Area B this layer is a coquina of large unio shells with a scattering of flints, limestone and bones. This is the typical "beach" material of the JRD sequence. Figures 20 to 23 show a general view of this surface during excavation.

Figure 20: Level 3a surface at the beginning of excavation of this layer.

Figure 21: Four views of Level 3a during excavation. Note the "Natufian Patch" at the northwest corner of Area B.

The more significant part of Layer 3a is a "patch" of denser coquina concentrated at the northwest corner of Area B, primarily in squares N-101; O-101; P-101; N-100; O-100; P-100 (Figs. 22-23).

Figure 22: Location of the Natufian Patch in Area B.

Figure 23: Natufian Patch - A view from the north. Note the contact with a reddish sand layer to the west.

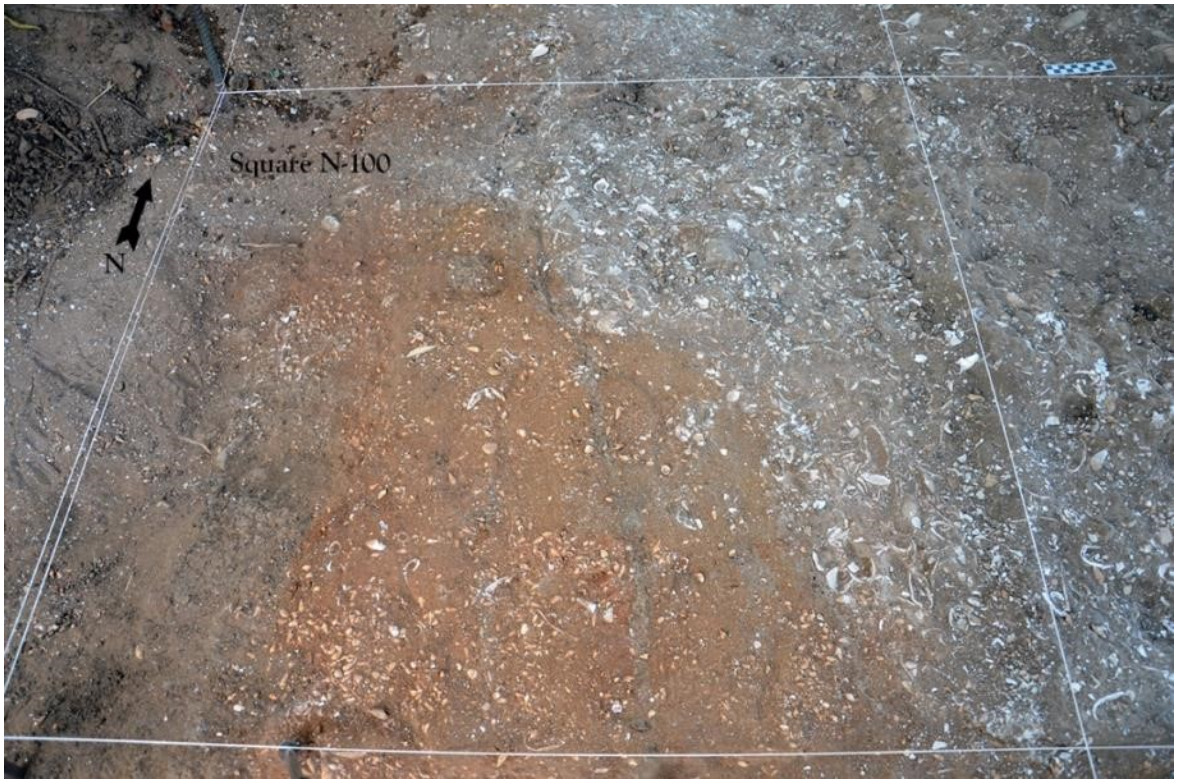

Figure 24: Contact between Unio Shells of the Natufian Patch and red Melanopsis sand to the west.

From the beginning of the excavation in this layer it was obvious that most of the finds in this layer would be found in this restricted area. The sediment is of dense coquina of large Unio shells with many flint tools, bones and small botanical remains. The sediment sieved and sorted from this patch is rich in micro-fauna. Stratigraphically, this "patch" is part of Level 3a or represents a filling of a shallow depression in this level. Below it are the mud level of 3a and the next level of 3b coquina. To the west, however, the patch is in sharp contact with a layer of reddish (oxidized) sand rich in Melanopsis shells (Fig. 24). The stratigraphic relations between the red Melanopsis, the Unio Patch and the sequence of the site is not yet clear. At the current state it can be suggested that the sites' sequence of replacement of sands and muds is in contact with oxidized layers forming the western part of the site. The Unio Patch was formed in a depression located at the contact between these two parts of the site and hence I bounded by mud/sand from the east and reddish Melanopsis from the west (Figs. 25-26). This reconstruction needs further study.

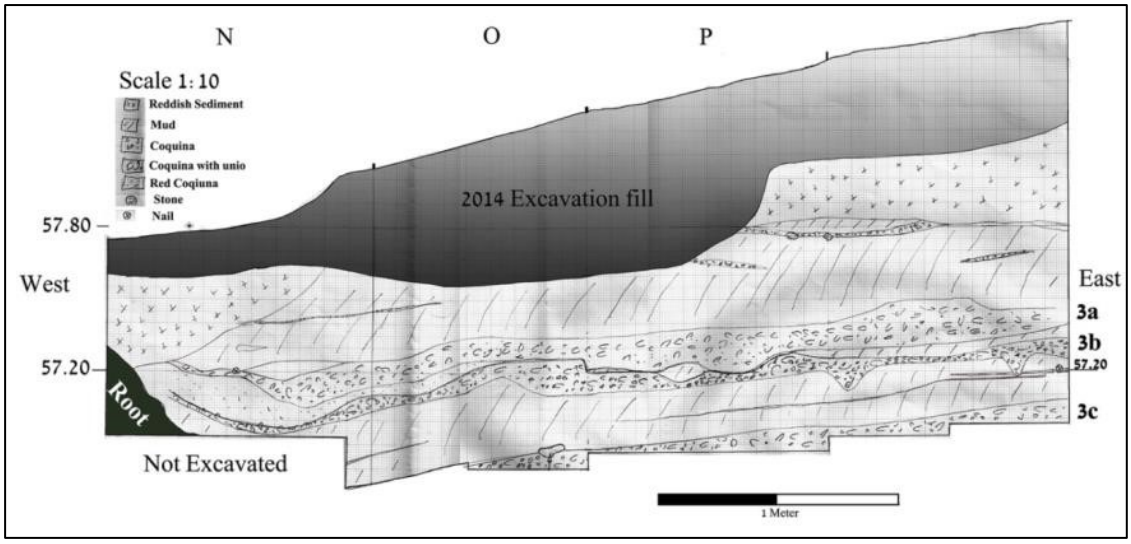

Figure 25: JRD 2015 Area B South Section drawing

Figure 26: JRD 2015 Area B South Section. Note location of "Natufian Patch".

Figure 27: Square N-101 surface during excavation of "Natufian Patch" at level 57.25. Note the flint tools.

At the northeast area of the patch and next to the north section a concentration of stone was found. These are cobble-sized rounded basalts heaped together in a pile that may have been created artificially. Figure 28 shows this strange phenomenon which will need further study before any further conclusions can be drawn.

The sand and Unio layer of the patch have yielded the richest assemblage of the site (Fig. 27). All of the stone tools from this area are Natufian and therefore the patch and the entirety of Level 3a are dated to the Natufian.

Figure 28: Stone "pile" at square P-101 levels 57.15.

The reddish oxidized Melanopsis sand to the west of the patch yielded a less rich lithic assemblage. However, one of the most significant finds of the site originated from this layer. The remains of a human skeleton in the form of three bones: a lower jaw bone and two long bones (see report below). The bones are spread along 2 squares (N-100 and N-101) but it is unclear if this distribution has any taphonomic or anatomic meaning.

Level 3b

Under the mud layer forming the lower part of 3a is the next sand and mollusc Layer 3b. This is a relatively thin horizon, with only few finds. After excavating a few squares in this layer we decided to remove it in order to reach the next layer. The layer was, therefore, excavated relatively quickly and only one bucket of every spit in each sub-square was sieved. No significant finds were unearthed during the excavation of this layer. However, sorting of the sampled sediments yielded 3 bone hooks. All of the hooks were found on the same day and from adjacent squares N-97, P-98 & Q-99. See description below.

Level 3c

This horizon covers the entire surface of Area B and is, generally speaking, a coquina of Unio shells, some 15 cm in thickness covered by grey mud and covering a grey mud layer (Fig. 29). Level 3c is relatively thick in comparison with the other beach horizons in the sequence and can be separated into 3 “phases”. From the top down, the level starts with sandy coquina of Unio, then the number of shells decreases and some 10 cm of sand are accumulated and, in the final stage, the number of Unio Shells increases again (Fig. 29). The 3c material was laid in a lake-margin environment. Nevertheless, the surface upon which it was laid was uneven. The upper surface of Layer 3c was exposed in a large area (Figs. 30-32) primarily in the southern part of Area B. It is sandy with many Unio shells, some flint artifacts occur but density is low, many limestone cobbles, pebbles and even flakes. The limestone cobbles were possibly brought by human agency to the site. They seem to be uniform in size and it seems that there is some kind of limestone workmanship on their surface. A large number of basalt stones are scattered all over the layer. A few are large, up to boulder size (Figs. 30-32) but others are the size of cobbles and pebbles. Many of the basalt stones show evidence of

battering, flaking and use. Some basalt flakes are present and, similar to the limestone, a basalt industry of some kind was practiced at this layer.

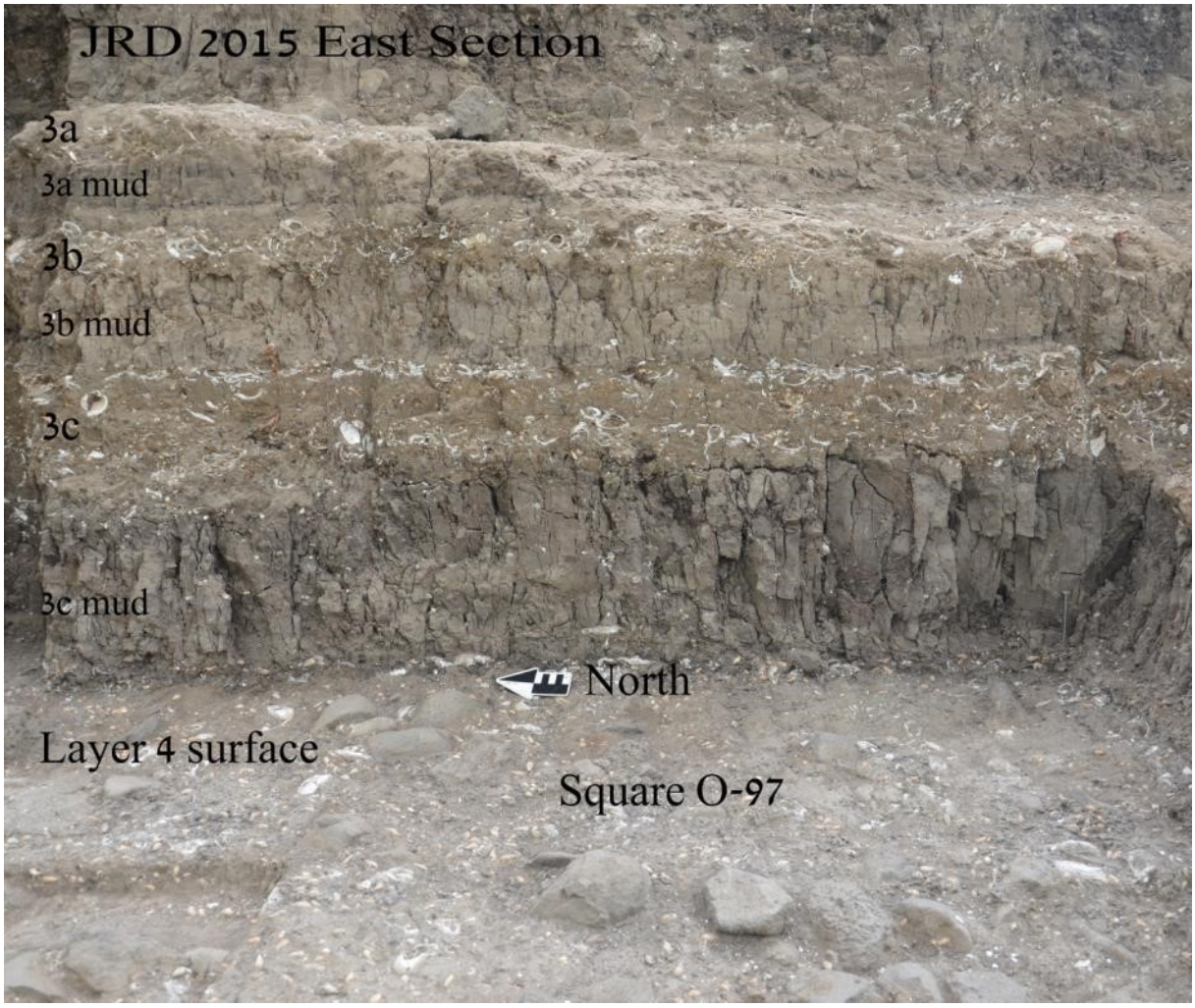

Figure 29: JRD 2015 Area B East Section stratigraphy. Indicating the correlation of levels and mud horizons attached to them.

Level 3c seems to slant slightly toward the west (Fig. 4) similar to Levels 3a and 3b, but it seems that the angle of slanting is somewhat stronger in Level 3c. If this slanting is a result of sloping of the beach toward the water body then it means that the lake was west of the site. The main problem with this suggestion is that the area west of the excavation is very limited. Only some 20 to 30 meters to the west is the very ancient sediment hill formed by the uplift of the Korazim formation. This uplift surely occurred prior to the Epipaleolithic. So either we are looking at a very narrow water body (yet sedimentology suggests a lake and not a river) or some other explanation should be suggested in the future.

Figure 30: Area B southern squares. Level 3c during excavation.


Figure 31: Area B southern squares. Level 3c during excavation.

Figure 32: Area B southern squares. Level 3c during excavation.

Figure 33: Level 3c surface in square O-97. Note the Unio shells

Layer 4

Layer 4 is the lowest layer excavated during the 2015 excavation season. It was reached only at the southern half of Area B and exposed in squares 196-197-198 (Fig. 5). In most of these squares, this layer is defined by a wealth of basalt and limestone cobbles and pebbles within a

muddy coquina of Unio (figs. 36-37). As in all other layers in the JRD sequence, Layer 4 is easily identified and defined at the eastern part of Area B and becomes less defined moving to the west. At the western-most squares, the line M squares (Fig. 5), the stratigraphy becomes hard to read. The difficulty begins with the layer covering Layer 4. In the eastern squares, Layer 4 is covered by the grey mud of Level 3c. However, in most squares, starting at the O line squares, the stone Layer 4 is covered by a sequence of fast-changing sediments including a layer of mini-shells, topping a layer of very large Melanopsis cemented into an extremely hard layer which covers a layer of mud and Unio into which the stones of Layer 4 are deposited (see below). This small scale stratigraphy is changing between the squares where large changes in sediment occur within a single square meter. At the current state of knowledge (end of 2015 season) it seems that the following reconstruction can be suggested:

Layer 4 is a lakeshore deposit covered by many stones of cobble to pebble size. As in all other horizons at the sequence, no natural, unworked, flint pebbles are present. The stones are all of basalt and limestone (Figs. 36-37). The limestone cobbles are relatively uniform in shape as well as in size. The great majority are flat elongated cobbles, many of which show evidence of battering and knapping, forming two notches. These are the 8 shape "net sinkers" (Nadel and Zaidner 2002; Marder et al. 2015). It is argued that all of the limestone in the layer was brought by the site's inhabitants from an unknown source of flat, elongated limestone cobbles. Smaller spheroidal limestone pebbles (2-4cm) also appear in the layer and may have also been brought in as fishing weights (Fig. 35). Some of the limestone in the layer may show evidence of burning but further research is needed. Basalt cobbles form the majority of the stones in Layer 4. Many of the basalt show evidence of battering, many are flaked cores or flakes and some are fragmented chunks. Like in the case of the limestone, it seems that many of the stones were brought by humans. Layer 4 is, therefore, a lakeshore environment with numerous stones brought in to be used as weights and tools. A single broken basalt pestle was discovered on this surface in square M-97 (Figs. 38-39).

Figure 34: Layer 4 exposed

Figure 35: Limestone net sinkers in Layer 4.

Figure 36: Area B southern squares Layer 4 surface during excavation.

Figure 37: Area B Layer 4 stone surface in squares P-96 & P-97.

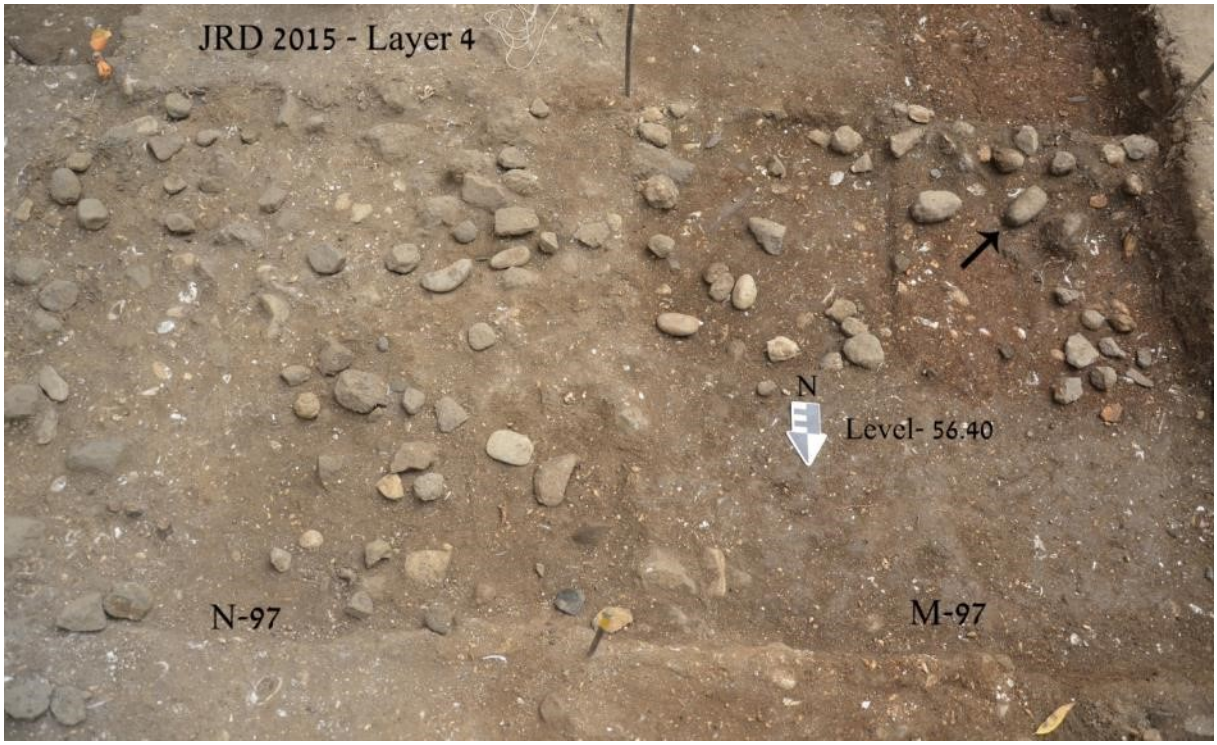

Figure 38: Layer 4 exposed in squares N-97 & M-97. Arrow indicates broken basalt pestle.

Figure 39: Broken basalt pestle in square M-97a Layer 4.

Figure 40: Stone horizon (probably Layer 4) in square M96, Level 56.40.

This Layer 4 lake-shore surface was covered by sediments of different origin in different parts of the area. In the M, N and P squares (the west and central part of Area B, Fig. 5) the Layer 4 surface is covered by mud (Fig. 42). This mud is then covered by cemented Melanopsis coquina (Fig. 42 d), which, in turn, is covered by a layer of mini-shells (Fig. 42c). It is very possible that these layers were deposited onto an uneven surface forming the top of Layer 4 and containing some local mini-channels as seen in squares N-197 & N-198 (Fig. 41).

Figure 41: Area D southern squares before exposing Layer 4. Level 3c mud is removed exposing mollusc layers and possible channel forming the upper part of Layer 4.

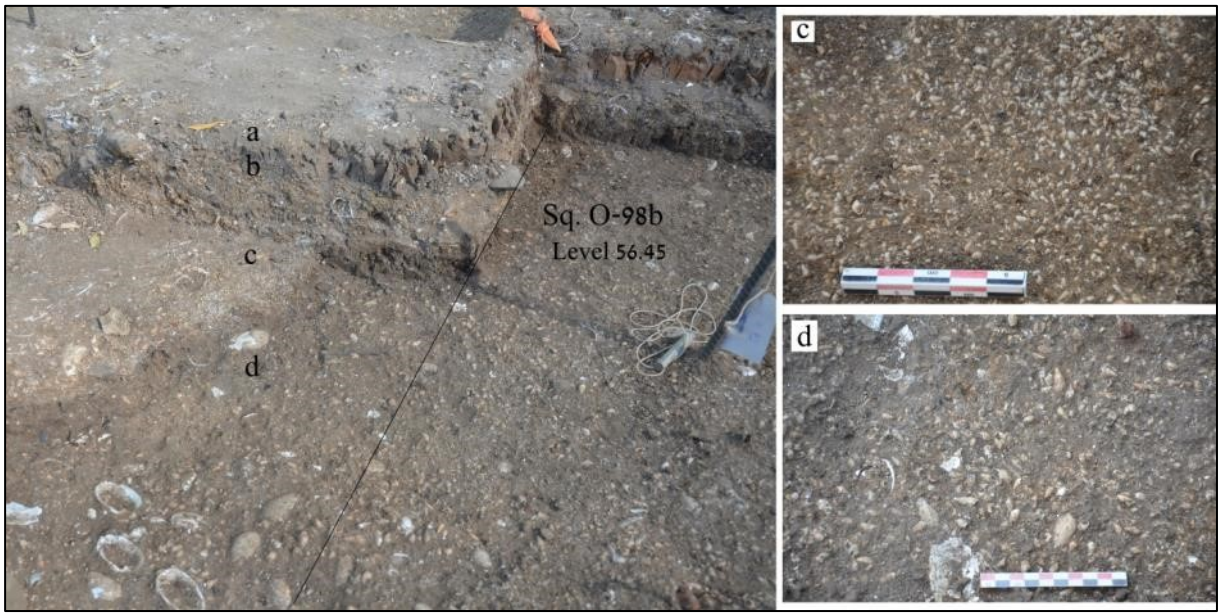

Figure 42: Stratigraphy of Mollusc layers above Layer 4. a. Level 3c; b. Level 3c mud; c. layer of micro-Molluscs; d. cemented large Melanopsis layer.

The stone surface of Layer 4 is dated, according to the typology of flint tools, to the Middle Epipaleolithic Geometric Kebaran. This is due to the presence of wide platform bladelet cores, end scrapers on elongated blades and, in particular, rectangular and trapezoid microliths (Fig. 43).

Figure 43: Rectangular and trapezoid microliths of Layer 4.

In the western part of Area B, in particular in the M square line (Fig.5), the sequence is much more disturbed. The sediments are changing intensely on a small scale: oxidized sand layers

are visible and the nature of the sediment is sandier (less mud/clay). At the current state it is hard to define the accurate stratigraphy for these squares and to relate it to the sequence to the east. Further excavation of this area will allow us better understanding. These, of course, are the richest squares in terms of flint artifacts and bones. Figure 44 demonstrates the problematic stratigraphy for Squares M-99 and N-99. It can be seen that the sequence of the eastern part of the site is disturbed by oxidized sand with Melanopsis shells from the west. The stratigraphic and chronological contact between these layers is still unclear.

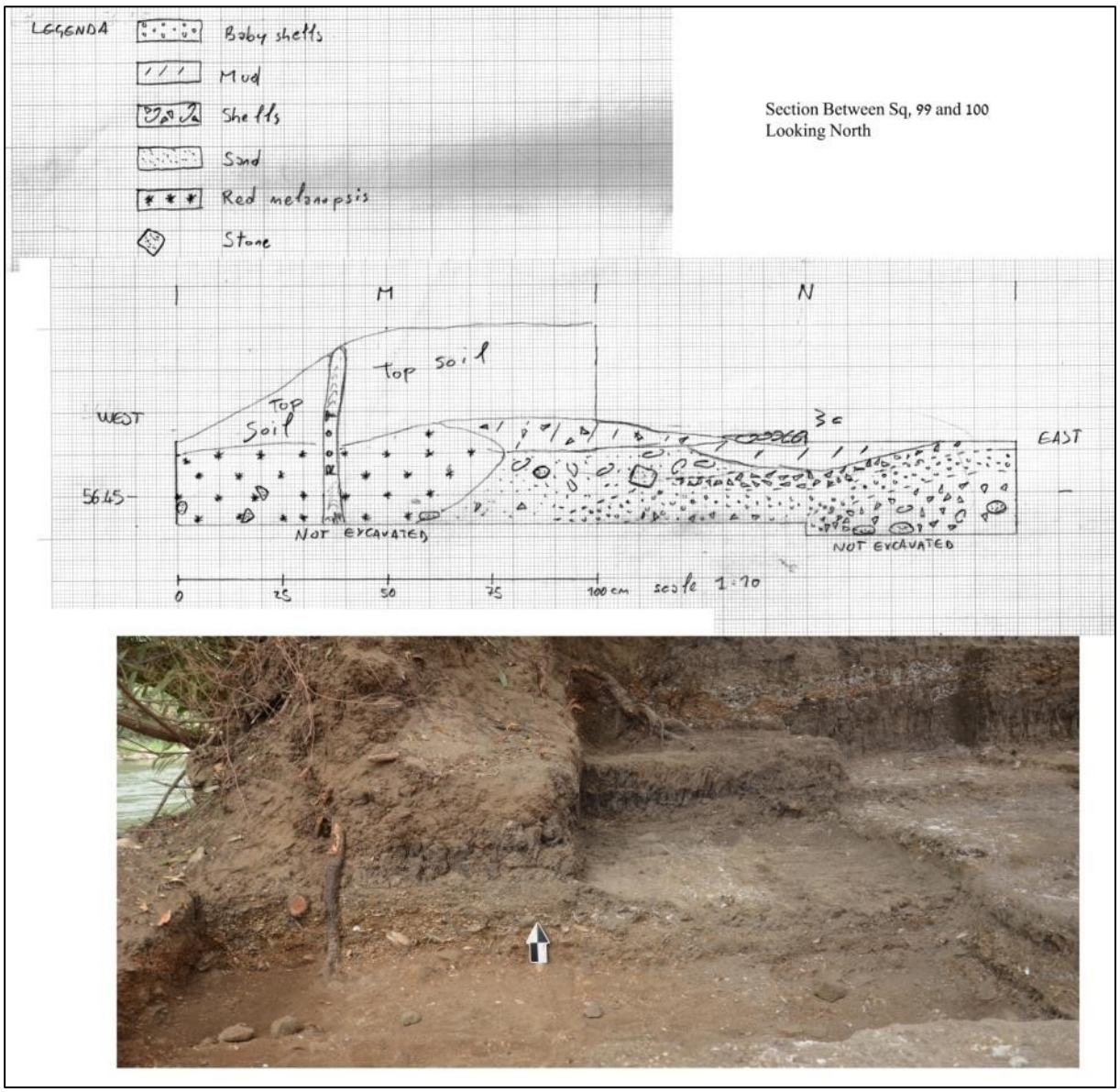

Figure 44: North section of Squares M-99 and N-99. This section illustrates the complex stratigraphy in the contact between the main site sequence to the east and the layers forming the western part of the site. a. drawing; b. photo.

Below the Layer 4 lake-shore deposit is, as in all other beach deposits in the sequence, a layer of mud. This mud was excavated in a test pit only in square P-96 (Fig. 45). It seems that the

thickness of this Layer 4 mud is some 20 cm and below it a new layer of sand beach material can be observed. One of the goals of the 2016 season will be to expose this layer and understand its nature.

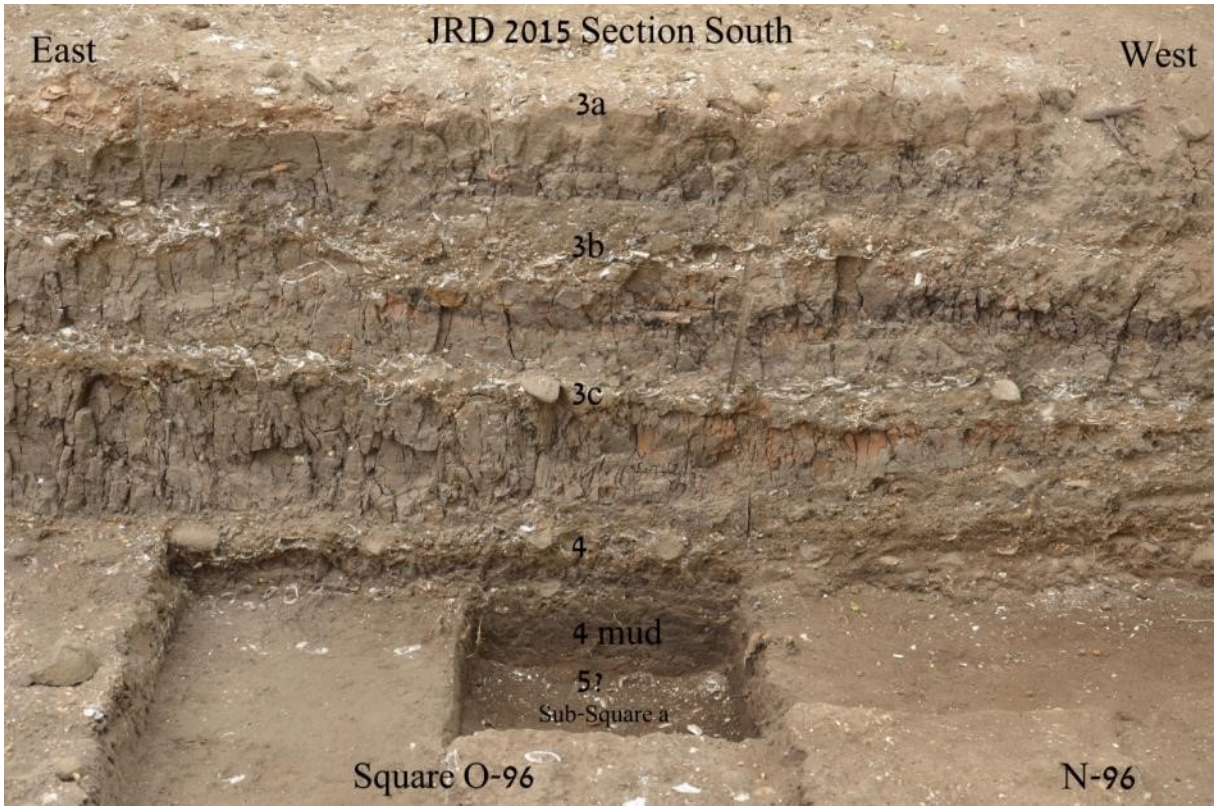

Figure 45: Stratigraphy of Area B south section at the end of 2015 excavation. Note the appearance of a new coquina horizon (Layer 5?) at the bottom of the test pit in sub-square o-96a.

JRD 2015 Excavation Season - Finds

Human Remains

The Human remains found at JRD consist of 2 bones found in squares N-100 and N-101. The spatial location of the bones is given in Figure 46. The bones were found at similar levels (even if not identical) and it is possible that they are all the remains of the same young individual (see below). It is too early to say if these are the remains of a burial. The bones are broken, and of special interest is the fact that the mandible bone exposed is lacking all teeth (Fig. 49). No human teeth were found in Area B which seems to indicate that the bones or at least the mandible is not in situ.

The human bones were found in below the Natufian “patch” of Level 3a (see above). However, they were found in the western squares within reddish oxidized Melanopsis rich sand (Fig. 47). The stratigraphic connection between the Patch and the red Melanopsis sand are unclear. The sand is next to the patch sediment at the same level but also below the white patch unio coquina (Fig. 44). Further research will hopefully clarify these questions.

Figure 46: Location of 2 human bones (arrows) in squares N-100 and N-101.

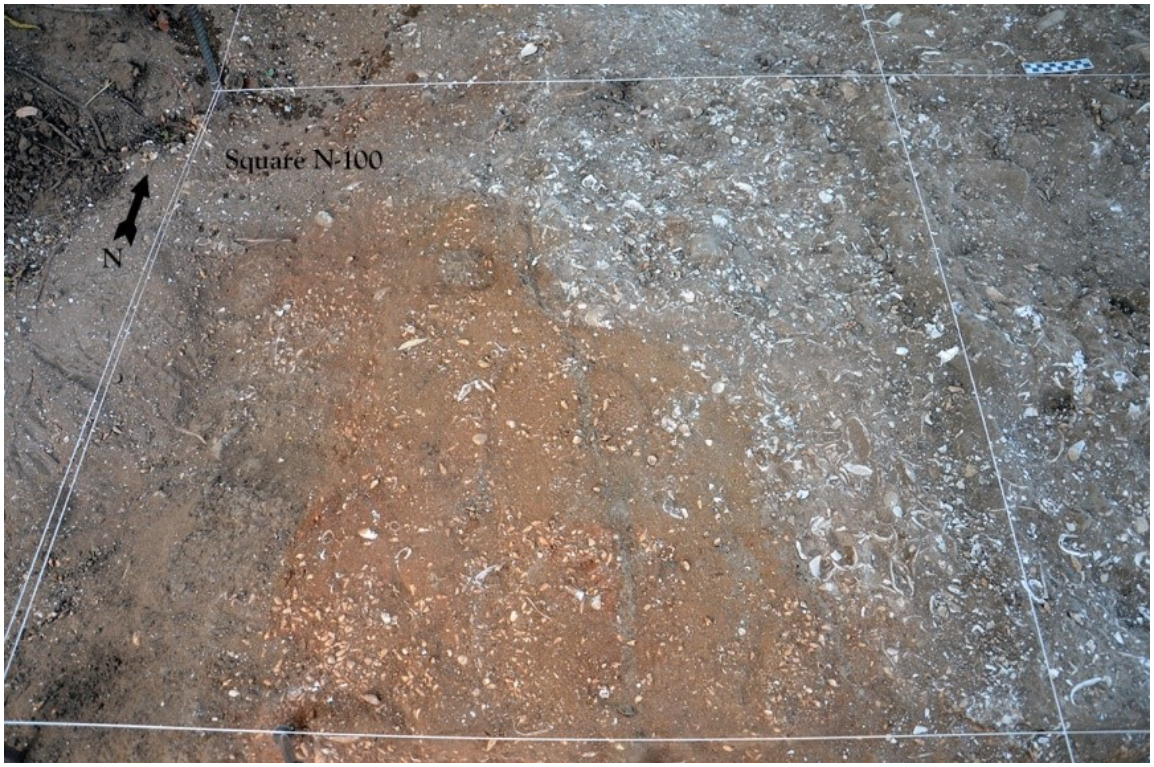

Figure 47: contact between "Natufian Patch" to the east and "red melnopsis sand" to the west in square N-100. The human remains were all found within the red melanopsis layer.

Figure 48: Location of human tibia in square N-101 during excavation

Figure 49: Human mandible in Square N-100 during excavation

Figure 50: Human tibia in square N-100.

Human Osteological finds JRD 2015

Alon Barash

During the 2015 season several large skeletal remains were found. Out of these, two are now classified as human remains:

Mandible: The jaw bone is only partially complete, missing the mandibular ramus on both sides as well as the entire dental arcade along with the entire inner alveolar corpus. the mandibular body is about 5.5cm in length with pronounced mental protuberance. no pathologies are apparent on the bone. The estimated small size of the mandible and the gracile appearance of the mental eminence (score 2 according to Walker, Buikstra & Uberlaker, 1994) indicates that the jaw belongs to wither female or a young adolescent individual.

Figure 51: Human Mandible JRD 2015

Tibia: A midshaft of the left tibia, without the proximal and distal ends. The bone measures about 22cm and is gracile and thin in appearance, indicating a young individual. No pathologies are apparent of the bone.

Figure 52: Human Tibia JRD 2015

To sum, both bones seems to belong to the same individual, either a female or a young adolescent.

The Flint Assemblage

Flint tools are found in all of JRD's archaeological horizons but in most cases do not appear in very high frequency. Frequency is low, in particular, when compared to other Epipaleolithic sites in the region where flint tools are extremely abundant. This low frequency is probably due to the nature of the site. The site documents a relatively short-term occupation of small bands on the banks of the Palo-Hula Lake. The primary activity documented at the sites layers (as seen after the 2015 season) is fishing. Therefore, flint knapping was not executed in large numbers and the flint tools left behind are not numerous.

Nevertheless, the flint tools are still the primary instrument for dating the layers and are attributed to different cultural phases. The top levels 3a to 3c are all assigned to the Natufian based on the presence of lunates, Natufian sickle blades and more (Fig. 53, 54a).

Figure 53: Natufian lunates from Area B upper horizons.

Figure 54: Use-ware shine on Natufian sickle blade (top) and end scraper on blade.

The Layer 4 assemblage, on the other hand, is assigned to the Middle Epipaleolithic Geometric Kebaran. This affiliation was set due to the presence of rectangular and trapezoid microliths in the assemblage (Fig. 43 & 55). In addition, the presence of end scrapers on blades, backed microlithis and wide platform bladelet cores all suggest Geometric Kebaran affinity for the assemblage.

Figure 55: End scraper on blade (Geometric Kebaran?)

Basalt

Basalt is the raw material of the majority of the stones excavated at JRD. Basalt is, in many cases, not easy to read technologically and the evidence for human utilization is sometimes debatable. Nevertheless, many of the larger basalt cobbles and small boulders may have been used as hammers or anvils. In addition, many of the basalt pieces show clear evidence for battering, and a few simple cores were collected, and fragmented chunks that could have resulted from knapping are common. Basalt flakes are present and a few tools were shaped on some of them. A single broken basalt pestle was found in Layer 4 (Figs. 38-39) suggesting an additional use for the basalt at the site. Due to the large number of basalt cobbles and pebbles in the Layer 4 surface, not all basalt stones were kept. Nevertheless, we recorded each and every stone by total station (numbers from 8000 and up in the JRD data base). After recording, all basalt stones were removed and only the ones showing utilization marks were kept and will be analyzed. In addition, all basalt artifacts and non-artifacts from square M-96 were kept as a sample for future study.

Limestone

Limestone is one of the unique and significant aspects of lithic industry at JRD. As mentioned above, it is common in many of the archaeological horizons of the site. It is suggested that most, if not all, of the limestone cobbles and pebbles in the archaeological horizons were brought to the site by human agency. Flat and elongated limestone cobbles and pebbles were collected at an unknown source according to their shape and size and brought in large numbers to the site, probably to be used as weights. Some of these limestone cobbles were used with no further modification while others were shaped to fit their use, in most cases by shaping two notches at both lateral edges to form the 8 shape of the weight, probably as a place to tie a rope (Fig. 56). Weights could be used as net sinkers or in other activities such as a stone loom. Hundreds of these limestone pieces are scattered on the archaeological horizons, with Layer 4 being the richest (Figs. 35 & 37).

Figure 56: Limestone net sinkers from JRD Area B 2015.

An additional use of limestone was the modification of small pebbles into fishing weights by carving a groove around the entire width of the pebbles, again probably in order to place fishing line. Two of these limestone weights were found as well as a single basalt weight (Fig. 57).

Figure 57: Small fishing line weights. 1. Basalt; 2 &3. Limestone

Bone tools

Bone tools were found in all of the archaeological horizons of JRD. The identification of some of the bones as bone tools is not easy as the shine observed on the bones may be the result of water activity rather than artificial polish. A few small bones, most likely long bird bones, were identified as bone tools, but more study is needed. In some cases, the identification of the bone tool was clear. The great majority of the bone tools were found in the layers assigned to the Natufian (Layers 3a to 3c). Figure 58 show two small bone tools in situ while Figure 59 is a close up of one of these tools.

Figure 58: Bone tools during excavation in square O-101.

Figure 59: Bone tool from square O-101

A large and unique bone tool was excavated in Square N-98 in Level 3c (Fig. 60). This is a large flat tool made out of a long, large mammal bone. The bone was split and polished to create a rounded tip on one end and a flat (somewhat broken now) spatula-like edge at the other hand. A deep groove was carved in one of the lateral edges and a flat one was shaped around the middle of the tool (Fig. 61). More study is needed, but a few similar examples from Neolithic sites (such as Nahal Hemar PPNB) may suggest that this is possibly a shuttle used in the weaving of nets.

Figure 60: Large bone tool during excavation in square N-98b.

Figure 61: Large bone tool of Square N-98b. Note the groove carved in the middle of the tool.

Figure 62: Large bone tool details. Note scratch marks on lateral ventral face of the tool (upper) and deep groove in tool's side (lower).

The most significant bone tools found during the 2015 season were three fishing hooks (Fig. 63). The 3 hooks came from the same layer (Level 3b) and were found during sediment sorting in the field. The 3 hooks are all made on bone demonstrating the highest level of workmanship possible. They are also exceptionally well-preserved. Two are complete and one is fragmented. Each one of them is somewhat different from the others in shape, size and design but it is clear that they were shaped to be tied to a fine rope as part of fishing rods.

Figure 63: Bone fishing hooks from Level 3b: 1. Square N-97c Level 57.01 to 56.92; 2. Square Q-99c 57.22 to 57.17; 3. Square P-98 Level 57.19 to 57.10.

Fauna Remains

Bone preservation is good in all of the JRD layers. Mammal bones are not numerous. Most of the faunal remain are of micro-fauna and fish (See below). A few beautiful canine teeth were exposed (Fig. 64).

Figure 64: Canidaes tooth from Area B

Amphibians, Lizards, Snakes and Rodents

Rebecca Biton

This section refers to the microvertebrate (i.e. amphibians, lizards, snakes and rodents) remains retrieved from JRD during the 2015 excavation season. Only a small portion of the bones are available at this stage since most of the microvertebrate remains are retrieved during picking of the sediment, a time consuming task. Osteological remains of rodents, amphibians and reptiles make up a substantial component of the JRD faunal assemblage. JRD is one of a few unique archaeological sites, mostly situated in the Hula Valley, that are waterlogged sites with an excellent preservation of faunal remains. Therefore, the research of the microvertebrate remains from the site holds great potential, especially for providing significant information on a variety of environmental and anthropological-related topics. Based on the taxonomic diversity of the microvertebrate species present at the site we hope to reconstruct the environment and climatic conditions of the site's surroundings while occupied by the Epipaleolithic populations. It will also be very interesting to compare the microvertebrate remains to other Pleistocene archaeological sites in the Hula Basin: some already published, Gesher Benot Ya'aqov (early Middle Pleistocene; Goren-Inbar et al., 2000; Rabinovich and Biton, 2011; Biton et al., 2013) and some still under study but already partially published Nahal Mahanayeem Outlet (Upper Pleistocene; Biton et al., 2013) and Ain Mallaha/Eynan (Late Pleistocene; Biton et al., 2013). Furthermore we are aware that some of the microvertebrate species could have been subjected to exploitation by humans. Therefore, the relationship between microvertebrate species and humans will be investigated using mainly taphonomic tools.

Preliminary results

JRD was most probably located on the shore of a Paleo-Hula Lake or some other permanent body of water during the occupation at the site. Therefore, in any work done, hydrophilous species, related to the natural biota of the Hula Basin (Dimentman et al., 1992 p.60) are expected to be encountered alongside terrestrial species from the adjacent Naftali Hills and the Golan Heights. The number of microvertebrate bones retrieved to date is 234 bones. Rodents, amphibians and reptiles are all present at the site (see table 1).

1. Amphibians: A total of 20 amphibian bones were retrieved, all of the bones were taxonomically studied. The amphibian bones were assigned to three different species (see table 1); the Levant green frog (*Pelophylax bedriagae*; N=8), the Hula painted frog (*Latonia nigriventer*; N=2) and the lemon-yellow tree frog (*Hyla savignyi*; N=1).

Table 1: Taxonomy list of herpetofauna retrieved at NMO

	Family	**Species**	
Amphibians	Alitydae	*Latonia nigriventer*	Hula painted frog
	Hylidae	*Hyla savignyi*	Lemon-yellow tree frog
	Ranidae	*Pelophylax bedriagae*	Levant green frog
Lizards	Anguidae	*Pseudopus apodus*	European glass lizard
	Chamaeleonidae	*Chamaeleo chamaeleon*	Mediterranean chameleon
Snakes	Colubridae	*Natrix tesselata*	Dice snake
		Medium coluber indet.	
		Large coluber indet.	
Rodents	Cricetidae	*Arvicola amphibius*	European water vole
		Microtus guentheri	Günther's vole

2. Lizards: 3 lizard bones were retrieved from the JRD sediments.

One scute and one vertebra were assigned to the European glass lizard (*Pseudopus apodus*). Another lizard identified is the Mediterranean chameleon (*Chamaeleo chamaeleon*) identified based on a small fragment of an upper jaw.

3. Snakes: The most abundant reptile element found is snake vertebras N=85. Most of the vertebras were taxonomically assigned to the dice snake (*Natrix tessellata*). At least one

medium size coluber and a large size coluber are also present; they have not yet been identified to species.

4. Rodents: A total of 125 rodent remains were recovered from the site to date. The majority is rodent incisors that were not further assigned to a species (N=82). 18 individual molars were assigned to the Günther's vole (*Microtus guentheri*). In addition, ten jaws including teeth were also assigned to this species. Günther's vole lives currently in meadows, watery plains and riverbanks (Mendelssohn and Yom-Tov, 1999). Another species recovered is the European water vole (*Arvicola amphibious*); five molar teeth were assigned to this species. This large vole is adaptable and survives in a range of habitats around rivers, streams and marshes in the lowlands and the mountains (Harrison and Bates 1991). In Israel it was probably common in the Hula swamps until the area was drained (Mendelssohn and Yom-Tov, 1999).

Environmental reconstruction based on microvertebrates

Based on the presence of the Levant green frog (*Pelophylax bedriagae*), the most abundant amphibian species at the site, a vegetated permanent water body or river bank was in the vicinity of the site at the time of occupation (Bouskila and Amitai, 2001; Disi et al., 2001). This is reinforced by the two additional amphibian species identified at the site, the Hula painted frog (Biton *et al*. 2013) and the lemon-yellow tree frog (*Hyla savignyi*). Moreover, the presence of the dice snake, a snake associated with vegetated watersides and river banks (Bouskila and Amitai, 2001; Disi *et al.*, 2001) also indicates the presence of a water body as does the presence of the European water vole (Harrison and Bates, 1991; Mendelssohn and Yom-Tov, 1999).

All the species present at site are species present in the Hula Valley today, or, as in the case of the European water vole, were present until the drainage of the Hula swamps. Therefore, based on the microvertebrate species composition at JRD, it seems the environment conditions were probably very close in terms of temperature and precipitation to present conditions.

Turtles Remains

Rebecca Biton

Two turtle species naturally occur today in the Hula Valley: the Western Caspian turtle (*Mauremys rivulata*) and the spur-thighed tortoise (*Testudo graeca*); both species were recovered at JRD. 27 bones belonging to turtles were identified to date. All of the bones retrieved are fragments of the carapace and plastron. Most are small fragments that could not be further assigned to a species (N=17). Three bones were assigned to the Western Caspian turtle (*Mauremys rivulata*) and seven to the spur-thighed tortoise (*Testudo graeca*).

Evidence from other Epipaleolithic sites in Israel indicates that the spur-thighed tortoise was used as a provender (Stiner et al., 2000; Bridault, *et al.*, 2008; Munro, 2009; Munro and Grosman, 2010; Yeshurun, et al., 2013), while their carapaces were employed as containers (Munro, 2013). Remains of these tortoises are also associated with burial practices (Garrod & Bate, 1937; Tchernov and Valla, 1997; Grosman, et al., 2008; Yeshurun, et al., 2013; Biton et al., in press). The presence of the Western Caspian turtle at prehistoric archaeological sites in Israel is scarce (Haas, 1966; Chazan, et al., 2001; Hartman, 2004; Hartman & Horwitz, 2007). Moreover, the exploitation of the Western Caspian turtle is only reported at one site, Nahal Mahanayeem Outlet (Upper Pleistocene; Biton et al., in press). Further taphonomic research will be needed to discover if both species were exploited at the site.

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Botanical remains

Botanical remains are relatively well-preserved in the JRD Area B sediment. It seems that the deeper the excavation, the better-preserved the remains. This is probably due to the higher levels of moisture in the lower levels. The sediment in the upper levels of the site was almost completely dry during the 2015 season. Only when we reached the lower levels, under Layer 4 at a level of c 56.50, did the sediment become wetter. The years since the 1999 drainage operation most likely caused the loss of many botanical remains in the upper layers. An additional problem that was noted during the 2015 season is the penetration of recent tree roots into the sediments. Even at depths of 2 meters below surface roots are clearly seen. It is easy to distinguish old wood from recent roots by their color. The ancient wood is darker, in many cases black. Nevertheless, this method is not fully reliable and misidentification surely occurred.

Wood remains were found in many of the squares and in all layers. Examples for the larger pieces are given in figures 65 & 67. Many of the botanical remains are found in the shape of charcoal, sometime in quite large chunks. Some of the layers are rich in charcoal but no clear hearth was identified (Fig. 65). Charcoal samples were collected and recorded for dating. One particular wood piece was unearthed in square N-101. This is a small twig twisted in a strange way, possibly artificial (Fig. 66)?

Figure 65: Charcoal rich sediment (sand) from square N-98 Level 56.60

Figure 66: Small wooden artifact (?) from square N-101.

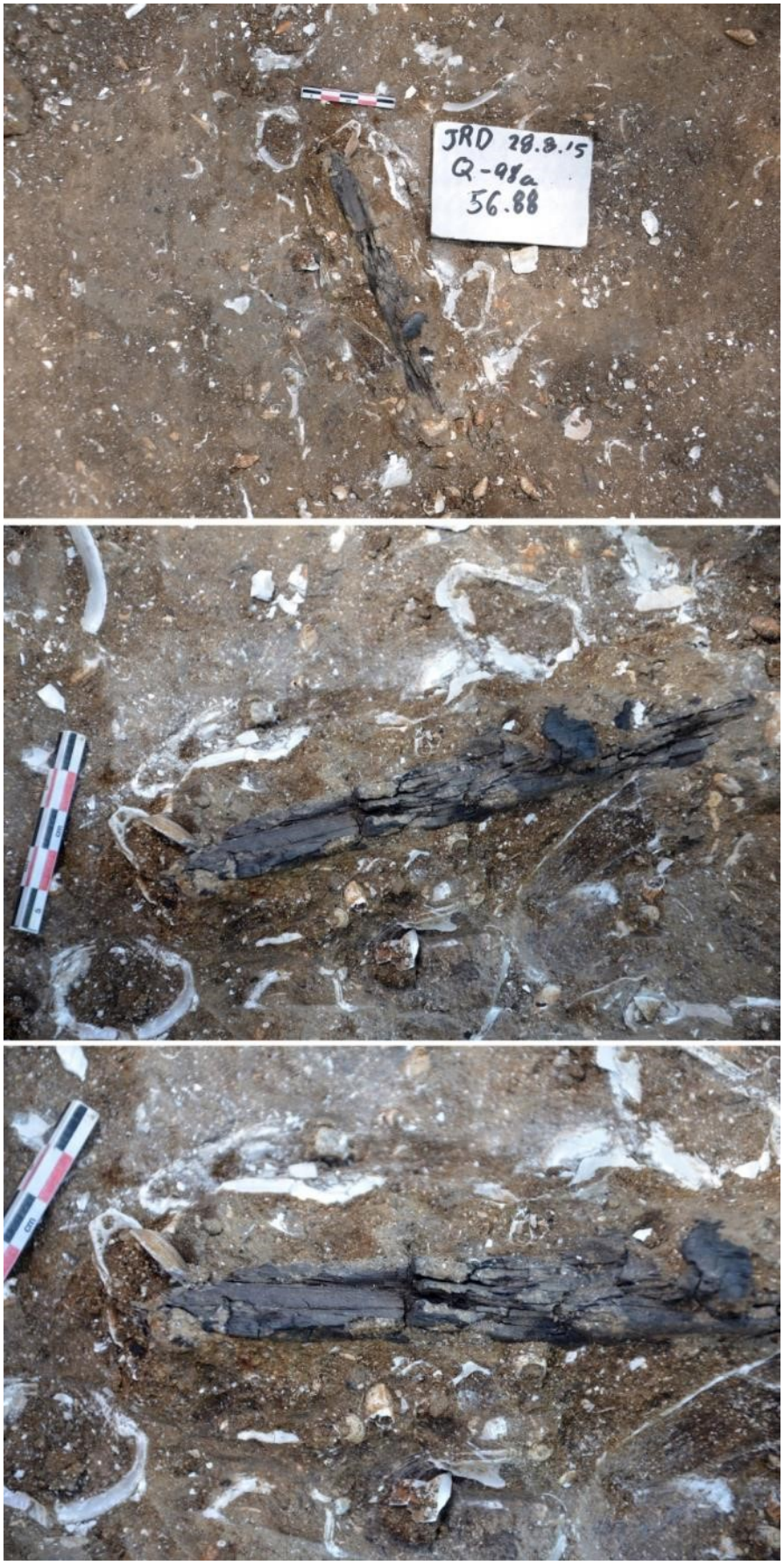

Figure 67: Wood (charcoal?) remains from square Q-98a.

Pollen

Three soil samples taken from the east section were sent to pollen analysis at the Laboratory of Archaeobotany and Ancient Environments, Tel Aviv University. The analysis showed relatively good preservation of pollen grains in the sediments, yet pollen concentrations were low, as expected for lake shore environment. The good preservation of pollen at the site's sediments will allow us to conduct an environmental investigation, including the systematic extraction of a sediment samples, establishing its chronological framework, describing its sedimentological characteristics and reconstructing past vegetation and climate conditions.

Molluscs

Molluscs are one of the primary components of the JRD archaeological horizons. The wealth of shells at the site, the species richness as well as additional taphonomic and environmental aspects were discussed by Ashkenazi (Marder et al. 2015). The 2015 Area B layers show the same richness and diversity in their mollusc assemblage. The study is at its very early stages. However, some preliminary observations can be presented:

The shells are a good stratigraphic indicator. The archaeological horizons, being lake-shore deposits, are rich in shells in changing frequencies. Melanopsis and Unio are clearly the dominant species where the presence of Unio shells seems to indicate a low water stand. Some of the shells are of exceptional size. In some of the layers very large Melanopsis were observed, but it is the giant size of the Unio that is most striking. Some of the site's layers probably represent ideal conditions for Unio. The outcome is exceptionally large shells in these layers (Fig. 68).

Figure 68: Giant Unio shells.

In other horizons, the absolute majority of shells are micro-molluscs, only a few millimeters in size. The layers, changing in thickness from 1 cm to as much as 20 cm in some places, are actually a coquina of these mini-shells (Fig. 69). This could indicate massive death of young individuals due to changing environmental conditions or sorting of shell size resulting from accumulation conditions.

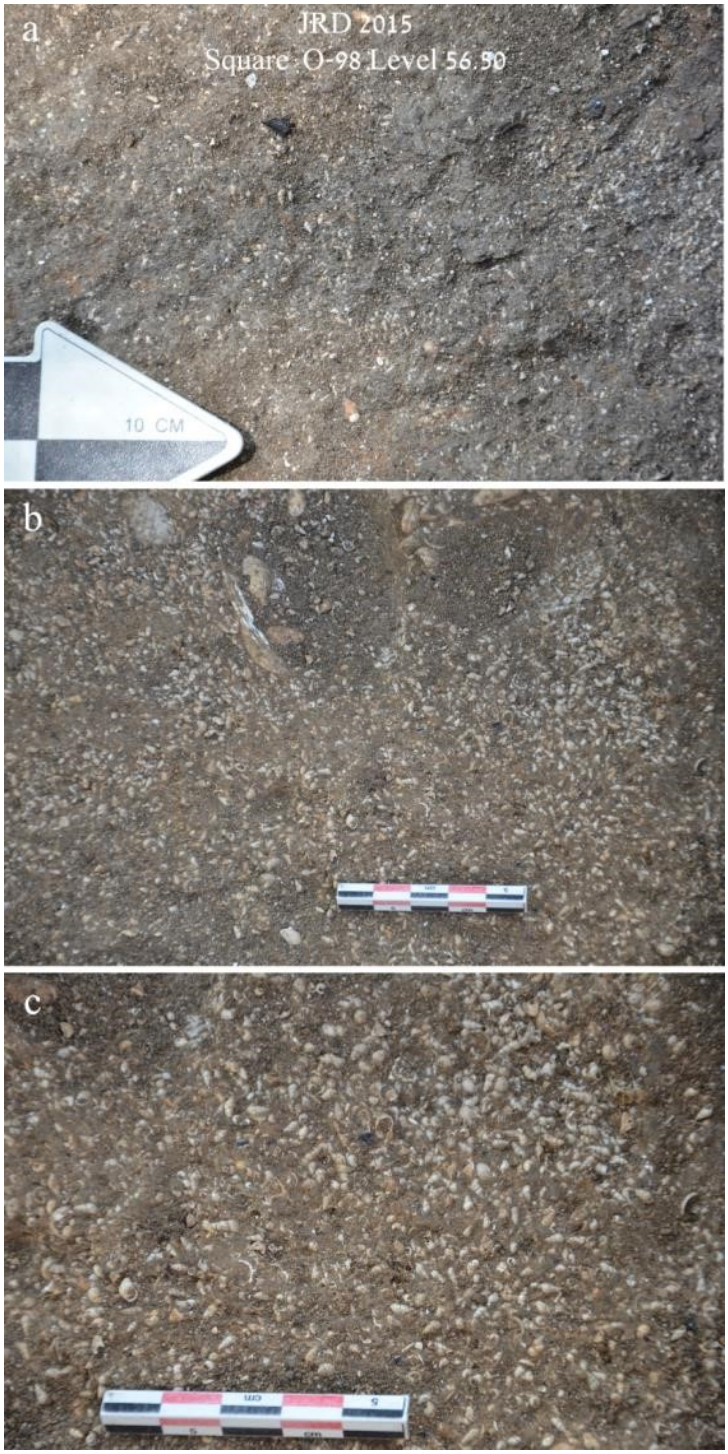

Figure 69: Layer of mini-shells in square O-98 (above Layer 4).

Ostracods

Steffen Mischke

A total of 43 samples from JRD were sent to the cooperation partner at University of Iceland for ostracod analysis of which 21 samples were analyzed to date. Subsamples of 15 g were

treated with 3% H2O2 for 48 hours and sieved with 100, 250 and 1000 µm sieves. Ostracod shells in the sediments from JRD are abundant and well-preserved. Thus, shell chemistry analysis such as stable oxygen isotope measurements will be feasible and an important tool to reconstruct climatic conditions (especially moisture availability) in the Hula Basin in the past. A total of 6314 ostracod shells were recovered from the treated samples (300 shells on average per sample). A total of 18 ostracod species were identified with Ilyocypris cf. bradyi as the dominating species (58 %). Candona angulata and Candona neglecta are also very abundant in the samples. Most species (such as both of Candona) are typical lake dwellers whilst Ilyocypris is a very typical inhabitant of flowing waters. It is expected that the ratio of Ilyocypris/all- other-ostracods can be used as a stream/lake indicator. All recorded taxa have been previously recorded from modern waters in Israel. Thus, the species assemblage data will provide valuable data for robust palaeoecological inferences.

Site preservation and closing

At the end of the season and in accordance with the conservation program of the site, the exposed layers were covered by thick plastic sheet (Fig 70) to mark the excavated surface. The entire excavation area was then covered by sediments (Fig. 71). This is done to protect the layers from the exposure to atmospheric conditions during the year, to prevent weathering of the sediments due to water winter floating and also for safety reasons.

The site was left totally covered by soil (Fig. 72). We created small trenches around the excavated surface to prevent vehicles from parking on top of the excavation (even if the damage should be minimal). In recent visits to the site, during the 2016 winter (which was mild), it seems that the site covering is holding well.

Figure 70: JRD Area B excavated surface covered at the end of the 2015 season

Figure 71: Tractor covering Area B at the end of the 2015 season

Figure 72: JRD Area B 2015 covered.

Conclusions

The 2015 excavation season at JRD enabled us to gain better understanding of the site's stratigraphy, chronology and the type of occupation. The primary conclusions can be summarized as follows:

The archaeological sequence of the site starts at a much younger period than was previously expected and covers the entire Epipaleolithic. The upper archaeological horizons, Level 3a to 3c are assigned to the Natufian, a stage that was previously unknown to be represented at the site (although some clues were observed, such as the young 14C date of c. 12000 years - (Marder et al. 2015).

The archaeological period found at the lowest layer excavated during the 2015 season (Layer 4) is Middle Epipaleolithic Geometric Kebaran. The results of the 2014 season suggested that the entire sequence of the site was of the Early Paleolithic Kebaran. In this respect, the presence of a well-defined Geometric Kebaran layer is somewhat surprising.

We clearly did not reach the lowest part of the archaeological sequence of the site during the 2015 season and the 2016 season will allow us to explore these layers.

The ecological and environmental findings of JRD are well-preserved although some evidence for damage and weathering can be observed. The upper horizons of the site are dry, and were probably dry for most of the year since the 1999 drainage operation. These layers

are not very rich with wood remains. More wood does appears in the lower, wetter, layers. An additional problem observed is the penetration of roots, primarily of wood, into the sediment. Preliminary studies and analysis indicate good preservation of ostracod and pollen in the layers. Molluscs are also well-preserved and will surely play an important role in environmental reconstruction of the site's layers. The preservation of charcoal is also good and it will be used for environmental study as well as for 14C dating.

The archaeological remains indicate that the primary activity at the site was fishing. Most of the archaeological layers exposed at JRD during the 2015 season tell a similar story: groups of fisherman used the lake-shore environment to fish. This is indicated from the wealth of fish bones as well as fishing gear in the layers. Fishing hooks and line weights indicate that fishing rods were used. The wealth of net sinkers indicates the use of nets for fishing. The location of the site, probably at the southern margins of the Paleo-Hula Lake, seems to have offered a good fishing spot for many generations of fishermen.

Some evidence does suggest, however, that more complex activity, beyond fishing, was practiced at the site. The presence of human bones, the basalt and limestone industry and more all suggest a more complex picture that will be explored during subsequent excavation seasons at JRD.

References

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Appendix 1

JRD - Excavation Daily Page 2015

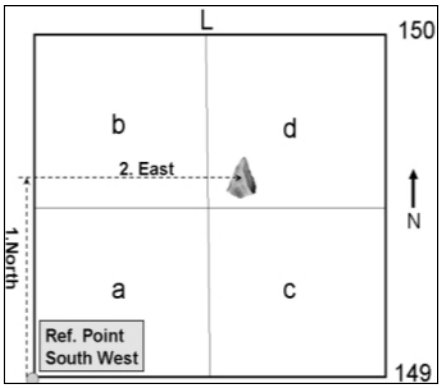
Date: _____/_____/2015

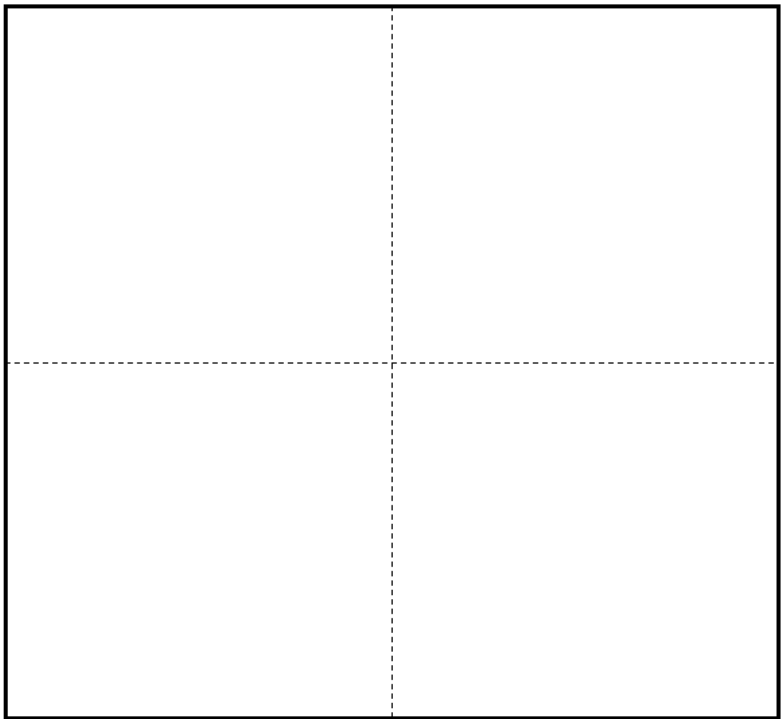
Excavator:_____

Area: _____

Square_____

Layer:_____





Example – Square L150d Find Coordinates

		SubSq. a	SubSq. b	SubSq. c	SubSq. d	Buckets
Spit #1	**Z- start**					
	Z - end					
Description & Remarks:						
		SubSq. a	**SubSq. b**	**SubSq. c**	**SubSq. d**	**Buckets**
Spit #2	**Z- start**					
	Z - end					
Description & Remarks:						