Jordan River Dureijat (JRD)

2014 Excavation Report

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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). Alongside the broad exposure of archaeological bearing sediments are uniquely well-preserved, ancient flora specimens. The sediments composing the banks of the Jordan River have been waterlogged since their accumulation. The result is a large botanical assemblage holding unique information on the environment of the Upper Dead Sea Rift and the behavior of early humans in this landscape (Goren-Inbar et al. 2002, 1994; Melamed 1997; Goren-Inbar et al. 2000; Melamed et al. 2011; Aharonovich et al. 2014; Kalbe et al. 2014).

The site of JRD was discovered during the massive drainage operation of the Jordan River in December 1999 (Sharon, Feibel, 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.1) 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 have been submitted for publication (Marder, Ashkenazi et al. in prep). Below is a brief summary of this data, followed by the findings from the 2014 excavation season.

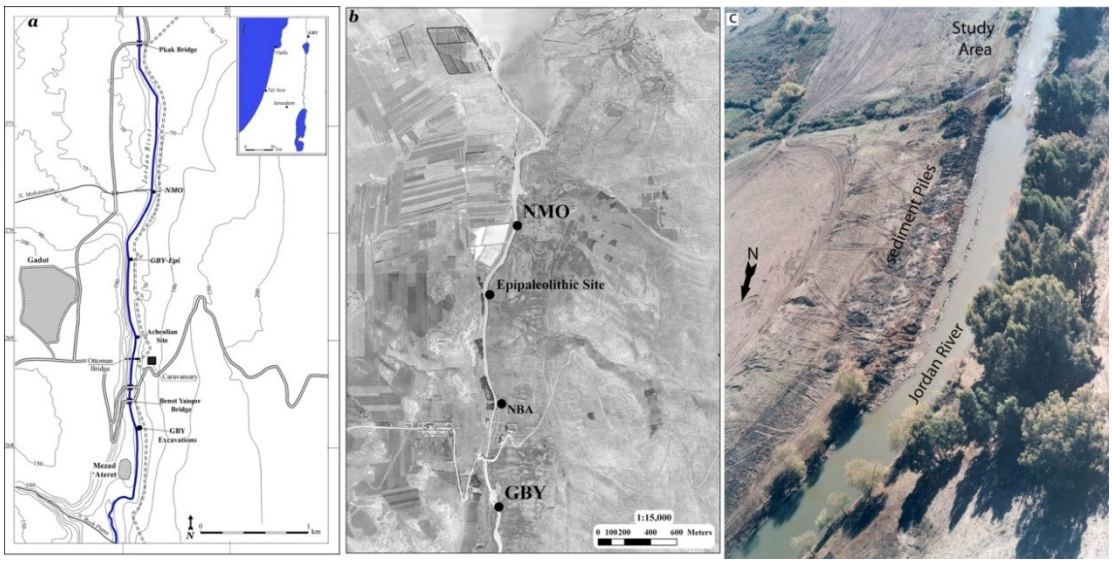

Figure 1: a. JRD location map; b. location of prehistoric sites on 1945 aerial photo; and c. view of the site during drainage work in 1999.

^{14}C Chronology of the site

The chronology of the site is based on charcoal samples collected from the 2002 survey and test excavation (as of this writing, samples from the 2014 season have not yet been dated). A total of 7 samples were dated by ^{14}C at the Weizmann Institute (Table 1; Fig. 2). Four samples were extracted from a sediment block on the bank of the Jordan River (Sharon, Feibel et al. 2002), while 3 additional samples were collected from the 6-02 section of the 2002 test excavation. The results are presented in Table 1. The dates suggest a relatively long occupation at the site. If we extract sample #2-02, which is from the upper part of the section and clearly younger than all the others (yet, still within the EP chronological boundaries), it seems that the dates cluster between 14000 and 15200 years (CL BC). Chronologically, JRD would clearly fall within the Middle EP (Geometric Kebaran; Goring-Morris and Belfer-Cohen 2010). Yet, the lithic assemblage suggests an Early EP (Kebaran) nature typology (Sharon, Marder et al. 2002). In an earlier publication we pointed out a similar chronological issue at the site of Urkn a-Rub (Hovers et al. 1988) where ^{14}C dates are much younger than the chronology suggested by the lithic assemblage. This question highlights the potential of JRD for the study of the chronology of the EP.

Table 1: 14C chronology for JRD after Marder et al. in prep.

Lab #	TYPE	^{14}C Age year (BP)	Calibrated age ±1σ year cal BP	Calibrated age ±2σ year cal BP	Collection Site	Sample ID	δ^{13}C (‰) PDB
Section I							
RTA 3653	wood	13770 ± 110	16850 - 16450	17010 - 16290	Upper archaeological horizon of Section 1 (sediment piles): Rich with archaeological material	EPI-GBY n.1	-28.9
RT 3655	wood	13440 ± 70	16280 - 16060	16415 - 15925	Archaeological layer in the middle of Section 1	EPI-GBY n.3	-28.4
Section 6-02							
RTT 4569	charcoal	12190 ± 70	14180 - 13990	14320 - 13805	Layer II. Level: 58.90.	EPI-GBY 02 #2	-25.7
RTT 4570	charcoal	13800 ± 70	16850 - 16545	16975 - 16410	Layer IV. Level: 58.65; Contact between small mollusks and clay layers.	EPI-GBY 02 #11	-26.6
RTT 4571	wood	13900 ± 70	16995 - 16710	17105 - 16550	Layer VI. Level: 58.45; Dark clay, lower part of section.	EPI-GBY 02 #15	-28.4
Sediment Pile							
RT 3654	wood	13075 ± 60	15815 - 15560	15915 - 15380	Randomly collected from the sediment piles	EPI-GBY n.2	-27.6
RT 3656	wood	13420 ± 135	16340 - 15945	16565 - 15750	From piles. In immediate proximity to flint flake	EPI-GBY n.4	-25.9

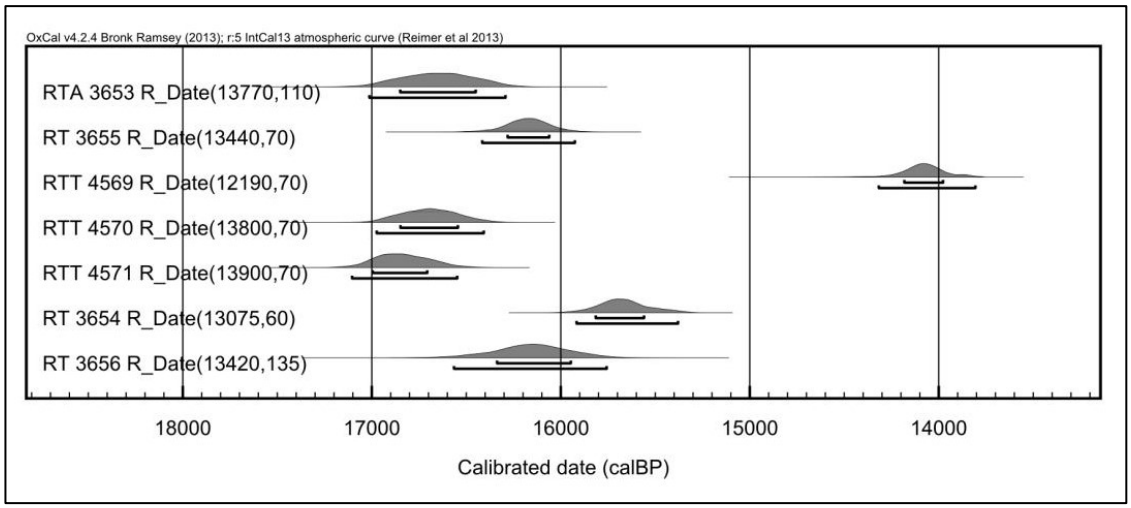

Figure 2: JRD ^{14}C probability graph

The Fauna

Similar to other sites excavated along the banks of the Upper Jordan River, the preservation of bones is excellent. The 2014 bones include a large spectrum of animal sizes, from cows to rodents, and many show evidence of human modification. Many tortoise shell pieces were observed as well as crab pinches (some appear to show evidence of burning). Good preservation of micro-fauna (rodents and reptiles) was noted. To date, one of the highlights of JRD is its mollusc assemblage. Prior to JRD, the presence of fish and other aquatic food sources such as crabs and molluscs in the Levantine Early EP human diet was largely unknown. The data presented here is the fruit of the labor of the late Dr. Shosh Ashkenazi (Ashkenazi et al. 2006). She identified as many as 47 taxa, including extinct species and possibly one that is new to science. Molluscs can contribute much data to our understanding of accumulation conditions and depositional processes, human behavior and diet as well as past environment (Marder et al. in Prep.).

The flora

Preliminary study of the samples from the 2002 test excavation at JRD yielded a wealth of seed and fruit identifications (Marder et al. in prep.). The data is highly valuable for reconstructing the paleo-environment of the region and the paleo-diet of the site's inhabitants. Edible species include the cereals of barley and possibly wheat, figs, grapes, and a few edible species of water plants. Preservation of botanical remains is excellent as demonstrated in igure 3.

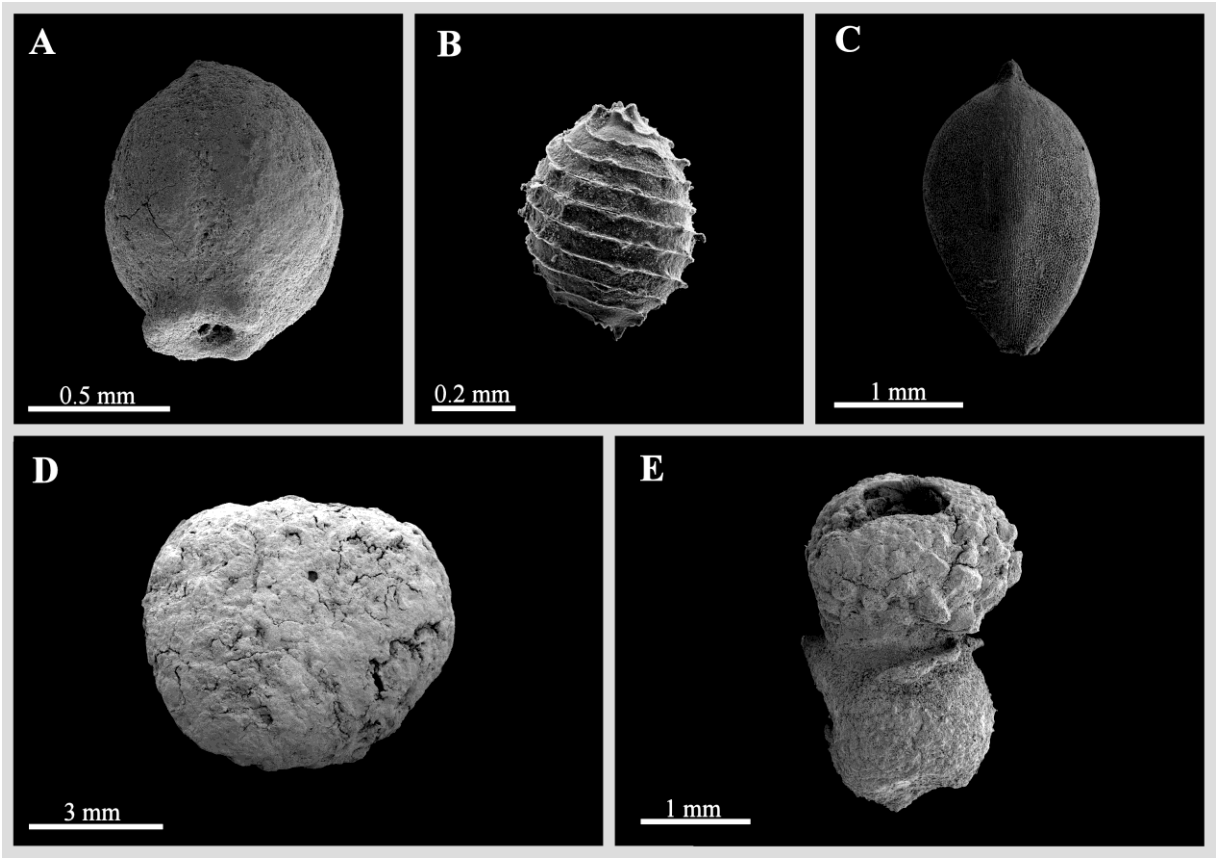

Figure 3: a. *Scirpus* cf. *lacustris*. Nutlet. Dorsal view; b. *Cladium mariscus*. Nutlet. The outer spongy layer is missing; c. Oogonium of Characeae species. Lateral view. The oogonium is enveloped by 5 spiral cells. d. *Quercus* sp. acorn base (hilum); e. *Quercus* sp. Female flower. The upper part of the ovary and the scale edges are broken.

THE 2014 EXCAVATION SEASON

During the fall of 2014 (September 28 to October 2) a short, test excavation season at the site was executed by Dr. Gonen Sharon in collaboration with Dr. Leore Grosman (Institute of Archaeology, The Hebrew University of Jerusalem) - Excavation license number *G65/2014*. The small team included students from The Hebrew University. The objectives of the excavation were to establish understanding of the site's stratigraphy, intensity of occupation and accumulation history, and to evaluate the potential of the site for a long-term excavation project.

During the 2014 season, 7 geological trenches were dug by tractor and 4 small areas were excavated (Fig. 4). The results indicate that the layers bearing archaeological remains extend to a minimum of 45 meters along the east bank of the Jordan River. The bank to the north was disturbed by drainage activity (Fig. 1c) and needs to be explored to the south. The archaeological horizons exposed on the bank do continue toward the east but preliminary observations in the trenches, primarily in Trench 0 (Fig. 4) suggest that the density of material decreases after a few meters. It should be noted that the winter of 2014 had one of the lower precipitation amounts (50% of annual rainfall) since recording began in the region. As a result, the extremely low water level of the Jordan River enabled us to collect information that would be very hard to retrieve in a "normal" year (Fig. 5). The low water level also caused the drying of sediments in the upper parts of the sequence and presumably the loss of many botanical remains (Fig. 6). An additional problem observed in all of the excavation areas is the penetration of recent roots of both trees and smaller plants into the archaeological sediments. In some of the excavated areas it is clear that the roots penetrate into the mud layers rather than into the coquina layers (Fig. XX). The effect of these post depositional processes on the excavated surfaces (apart from the obvious problem of removing the large roots during excavation) should be evaluated in future excavation.

The site's datum was set on top of a rock on the east bank of the Jordan River. The level was calculated from the level of the base of the electricity pole next to the road immediately above the site of NMO, 600 meters to the south. The JRD datum was set to 58.82 meters above sea level.

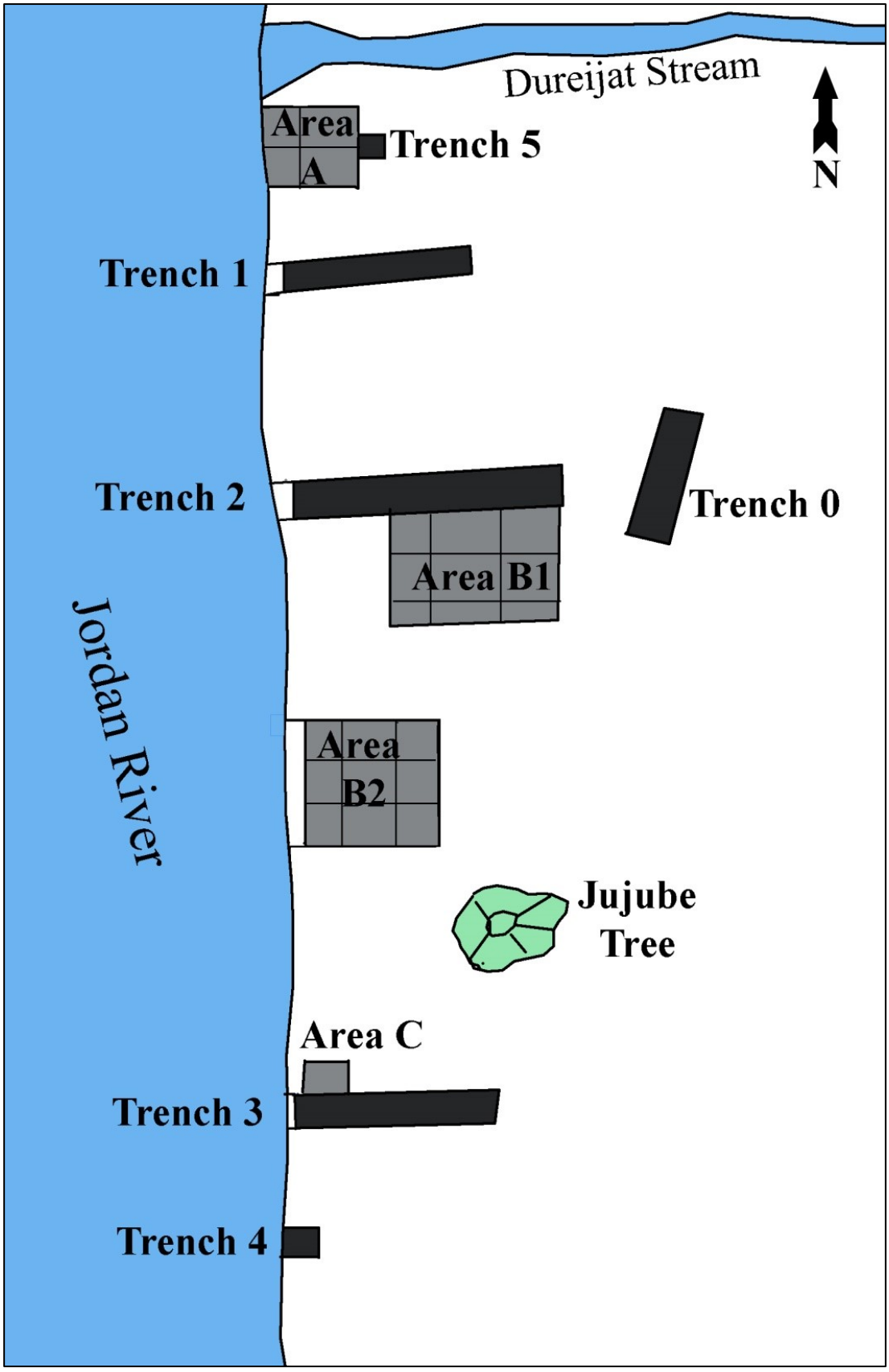

Figure 4: Location map of the 2014 excavation areas and geological trenches

Figure 5: Low water Level during the summer of 2014

Figure 6: dry botanic material at Jordan River bank, Summer 2014.

Figure 7 : Roots penetrating the sediments at the top of the section of Area C (see below)

Tractor test trenches:

Six trenches were dug by tractor in different locations along the river bank in order to establish the stratigraphy of the site and to explore its extent along the bank and toward the east. The location of the trenches is presented in Figure 2. At all of the trenches a stretch of bank was left between the river and the trench in order to prevent water from filling the trench. Water eventually penetrated all of the trenches, filling their lower part. Whether the water originated from the Jordan or from the east (or both) is yet unknown. Below is a description of the finds from each of the trenches as well as a drawn section:

Trench 0This is the easternmost trench, excavated in an attempt to establish the spreading of the archaeological layers toward the east. The location of Trench 0 in relation to Trench 2 and the Jordan River is presented in Figure 8.

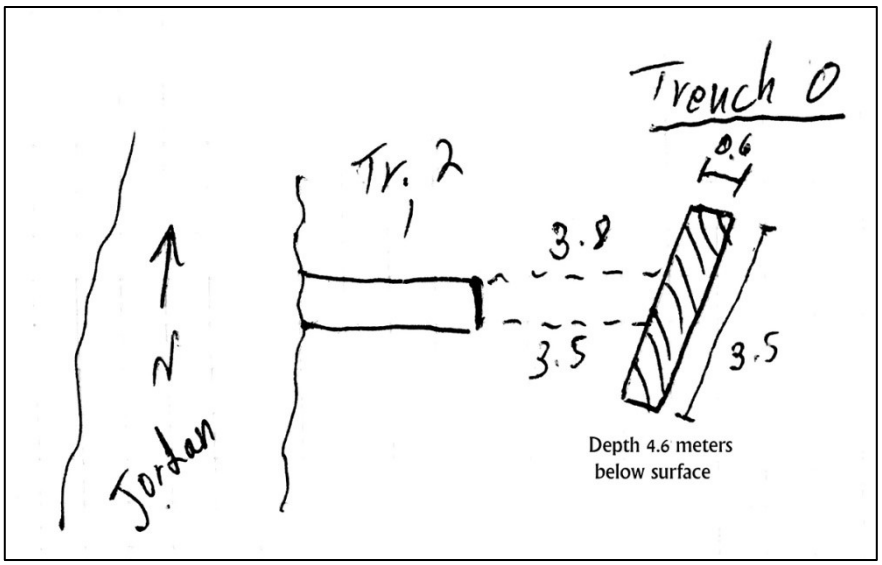

Figure 8 : Location of Trench 0.

Trench 0 was dug to a depth of 4.6 meters below the surface. At the bottom of the trench a layer of basalt boulders prevented further digging. This layer may be the base of the stratigtraphic sequence of the entire site; however, further study is necessary for confirmation. Above the basalt layer are many layers of mud and molluscs but only a single (rolled) flint flake was found and no bones. Even if the archaeological layer exists here, its findings are scattered and not rich. The bottom mud layer, similar to those uncovered in the other trenches, is comprised of many crushed mollusks in mud and carries an odor of swampy, decomposed organic material.

Figure 9 : Trench 0.

Trench 1

This trench, excavated at the northern section of the site, is east-west oriented, starting at the river bank and stretching toward the east (Figs. 10-12). Here, too, a layer of basalt boulders was reached that prevented further digging. Above this layer is a sequence of coquinas and muds (Figs. 13-14). Some flint tools were observed but it seems that no dense archaeological layer was uncovered. The layers at the base of the sequence have an odor from swampy, decomposing organic material.

Figure 10 : West part of Trench 1. Note the archaeological horizons at the bottom.

Figure 11: Trench 1.

Figure 12: East section of Trench 1.

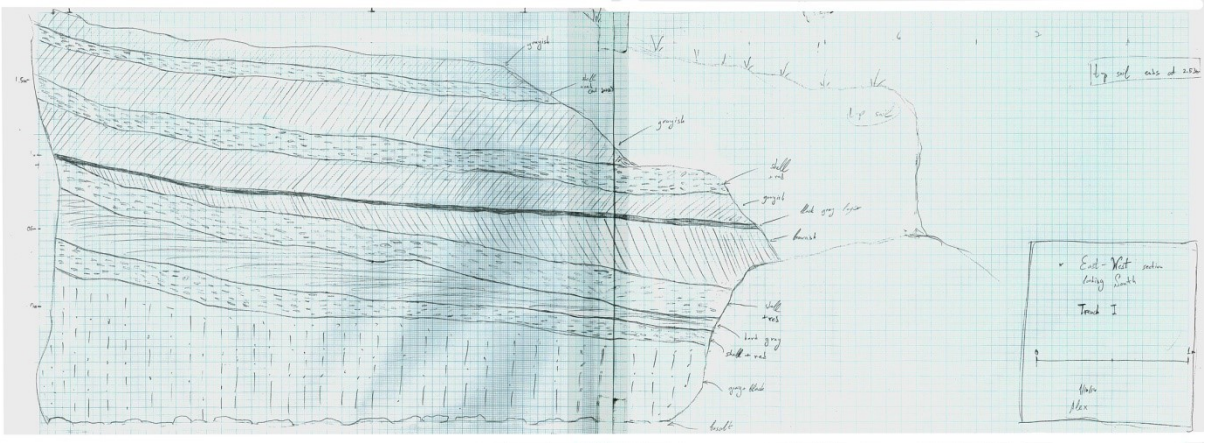

Figure 13: Section of Trench 1 South wall. Drawing by Alex.

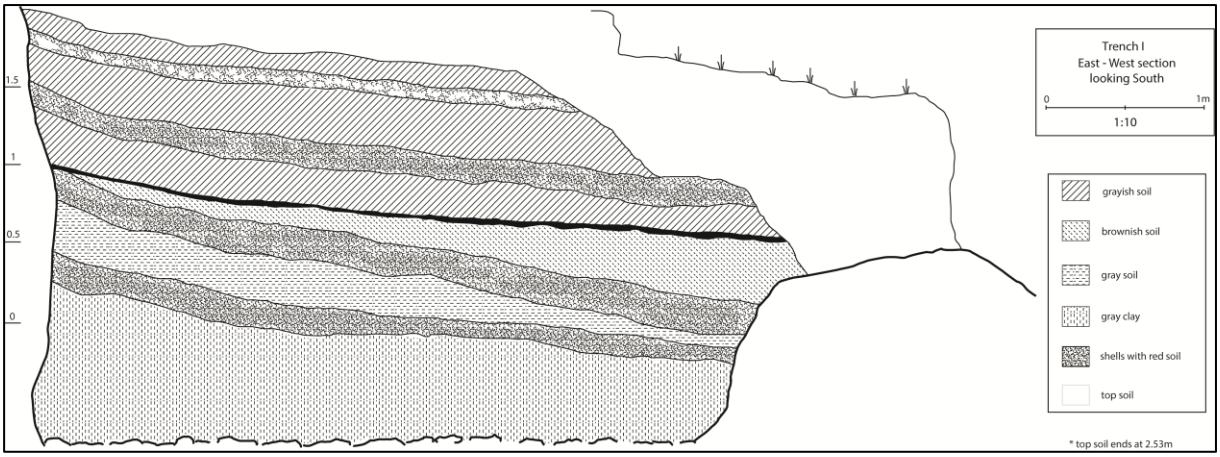

Figure14 : Computer drawn of South Section of Trench 1.

Trench 2

This is an additional trench dug at an east-west orientation starting at the river bank (Fig. 15). At the bottom of the trench, large basalt boulders were exposed. Above the basalt is the usual sequence of coquinas of crushed mollusk and smelly muds (Figs. 16-18). However, within this sequence, there is a layer of small pebbles with many flint flakes, some bones (including micro-fauna), and even wood remains. Soil samples were collected from this trench in 20cm intervals, which were systematically sieved and sorted (bag labels are in the following format: Tr. 2 -60:-40). Next to Trench 2 excavation Area B1 was opened (Fig. 15 & see below).

Figure15 : Trench 2 and Area B1 to its south.

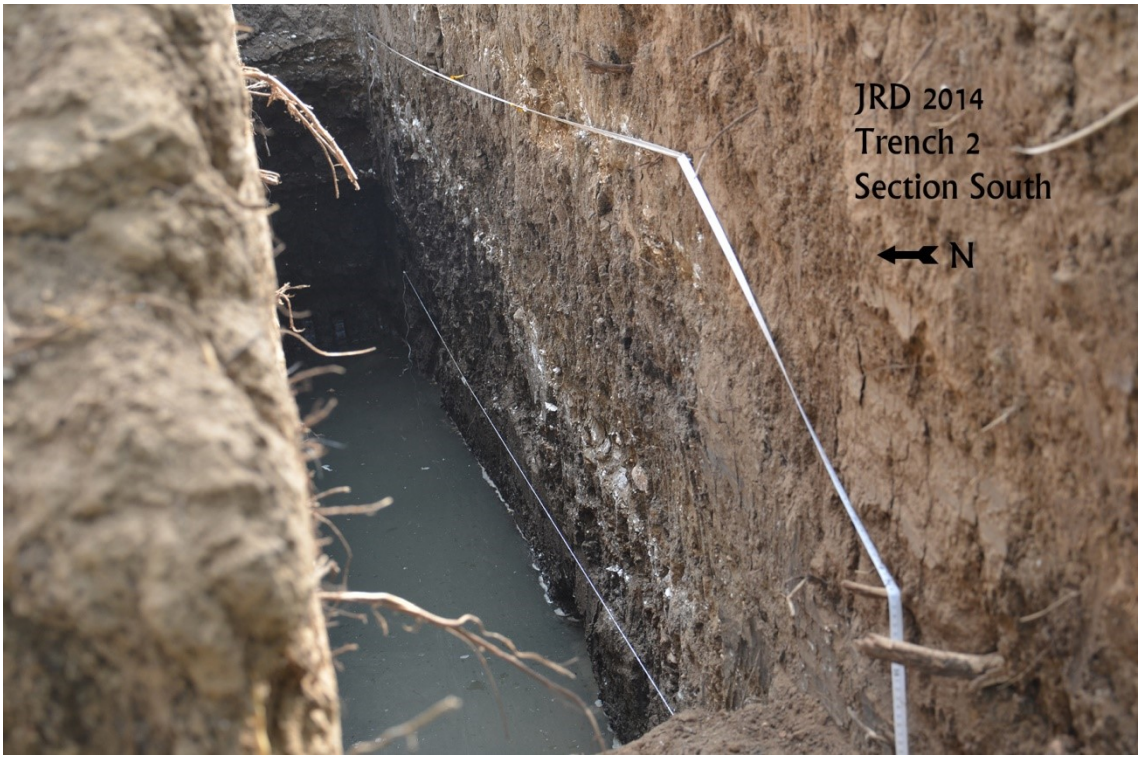

Figure16 : Trench 2 South Section

Figure17 : Trench 2 East Section

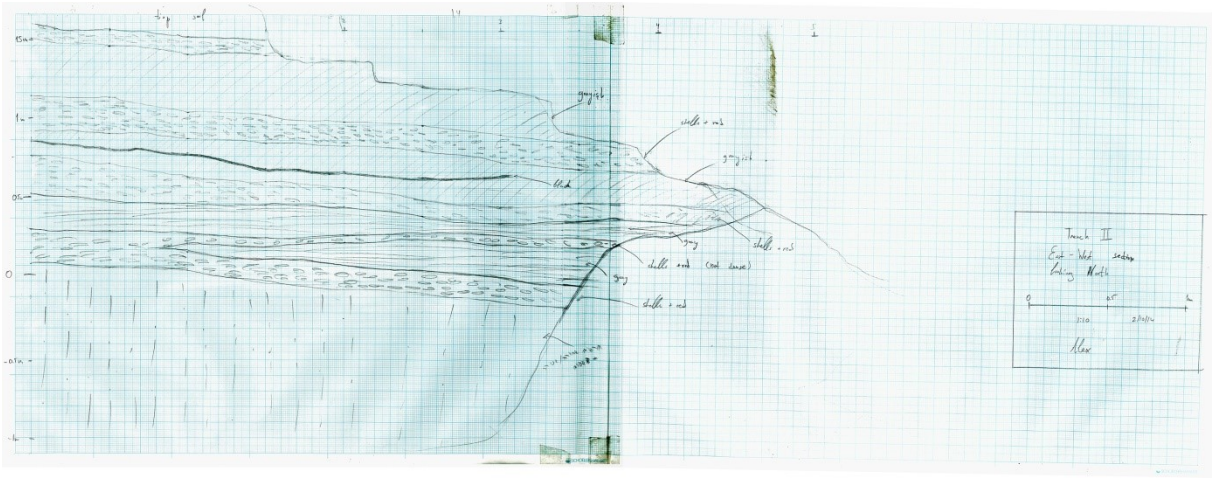

Figure18 : Trench 2. Section South draw

Trench 3

This trench was excavated at the south part of the site where the river bank is littered with stone tools and bones (Fig. 19). The usual sequence of coquinas and mud was observed, yet in the west part of the trench, in proximity to the river bank, some of the coquinas are very rich with Unia shells and archaeological finds (Fig. 20) . Excavation Area C was opened immediately north of this trench (see below).

Figure19 : Trench 3.

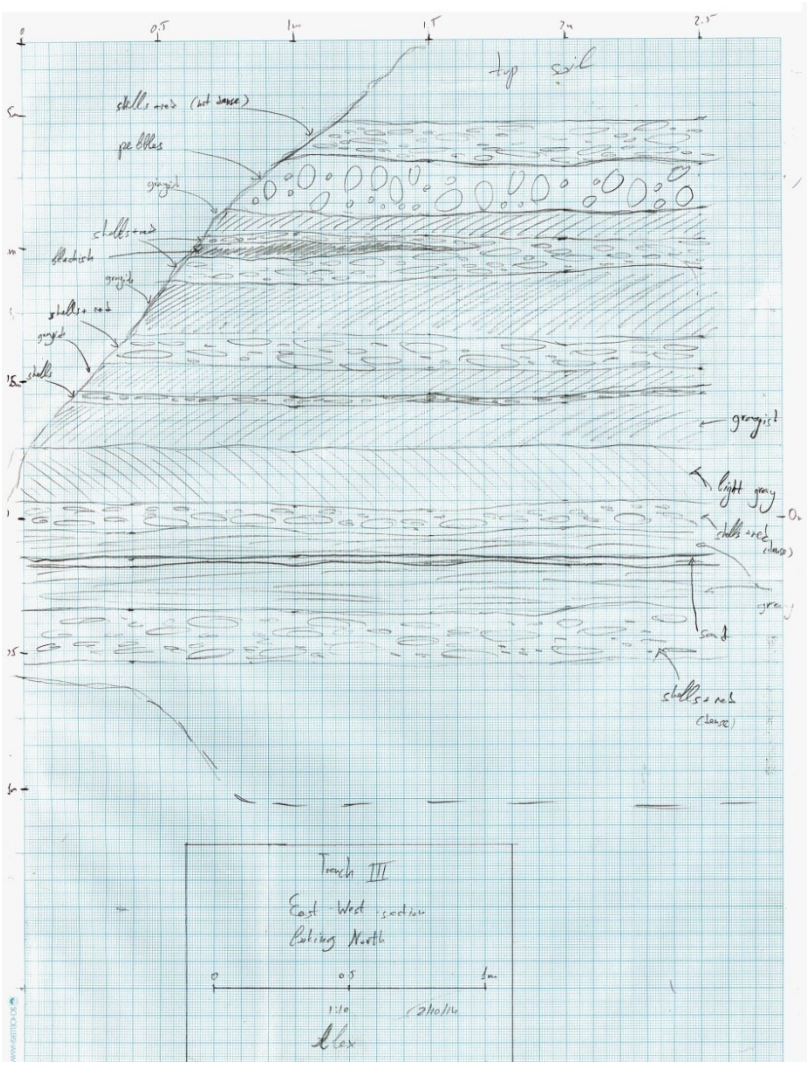

Figure 20 : Trench 3 North Section draw.

Trench 4. At the southernmost part of the site, a few meters after the basalt cobble layer at the base of the sequence slants down and disappears from the river bank (see discussion of the stratigraphy below) an additional, small trench was dug. This trench is not actually a trench but rather a cleaning of the river bank section. A sequence of mud and coquinas was documented, with two very rare archaeological remains, a medium-sized bone in good preservation state and a nice, fresh blade. It seems that the density of the archaeological layers drops toward the south at this point, but more detailed study is needed before a clear conclusion can be drawn.

Trench 5. This short trench (Fig. 23), dug eastward from the river bank at the northernmost part of the site, immediately south of the outlet of the Dureijat stream into the Jordan River, exposed some of the richest archaeological horizons of the site – Area A (See below).

Figure 23 : Trench 5.

Excavation Area 2014

All excavation areas opened during the 2014 season were actually test pits rather than large-scale excavation areas. The location and levels of the areas were recorded using a total station device.

Area A

This area, in the northern part of the site, was one of the richest in finds (Fig. 24). The area is located immediately south of the outlet of the Dureijat stream into the Jordan River. Trench 5 is in the middle of the site with its wall forming the east section of Area A. The archaeological horizons were found primarily at the base of the stratigraphic sequence within layers of coquina (Fig. 25). The dominant mollusks here seem to be melanopsis. Next to the melanopsis are numerous shells of Unia, some of which are the largest we have seen anywhere on the banks of the Jordan River (up to 20 cm in maximal dimension). The coquina layers are reddish in color, probably due to oxidation of the iron rich (basalt origin) sediments. The finds include numerous flint flakes including microliths, bones in good preservation state and large amount of charcoal (Fig. 26). The stratigraphy is described in Figs. 27-28.

The excavation began at c. 40 cm above surface level and the final level reached was c. 10cm above surface level. The excavated squares are L1034; L1035; L1036 and K1035. Many basalt flakes were observed in the southern squares of Area A. This may suggest the occurrence of basalt tool production in this location. Three basalt fragments may have resulted from basalt grinding stones. The flint assemblage contains numerous small flakes and bladelets. In square L1034 sub-square b, three bladelet cores were found in a group.

Figure 24 : JRD 2014 Area A.

Figure25 : Area A excavation and nature of archaeological layers

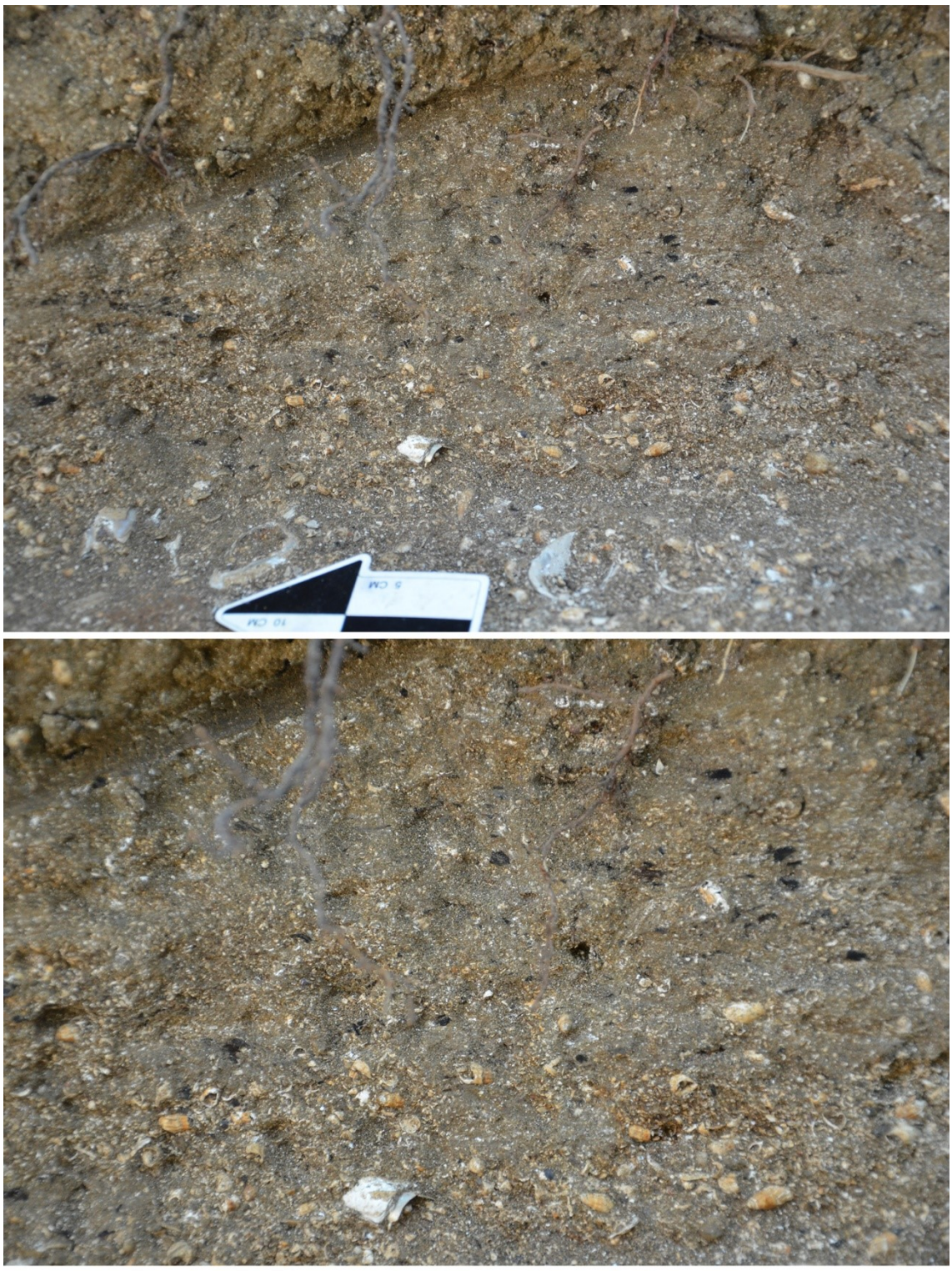

Figure 26 : Charcoal in Area A archaeological horizon.

Figure 27 : Area A East Section

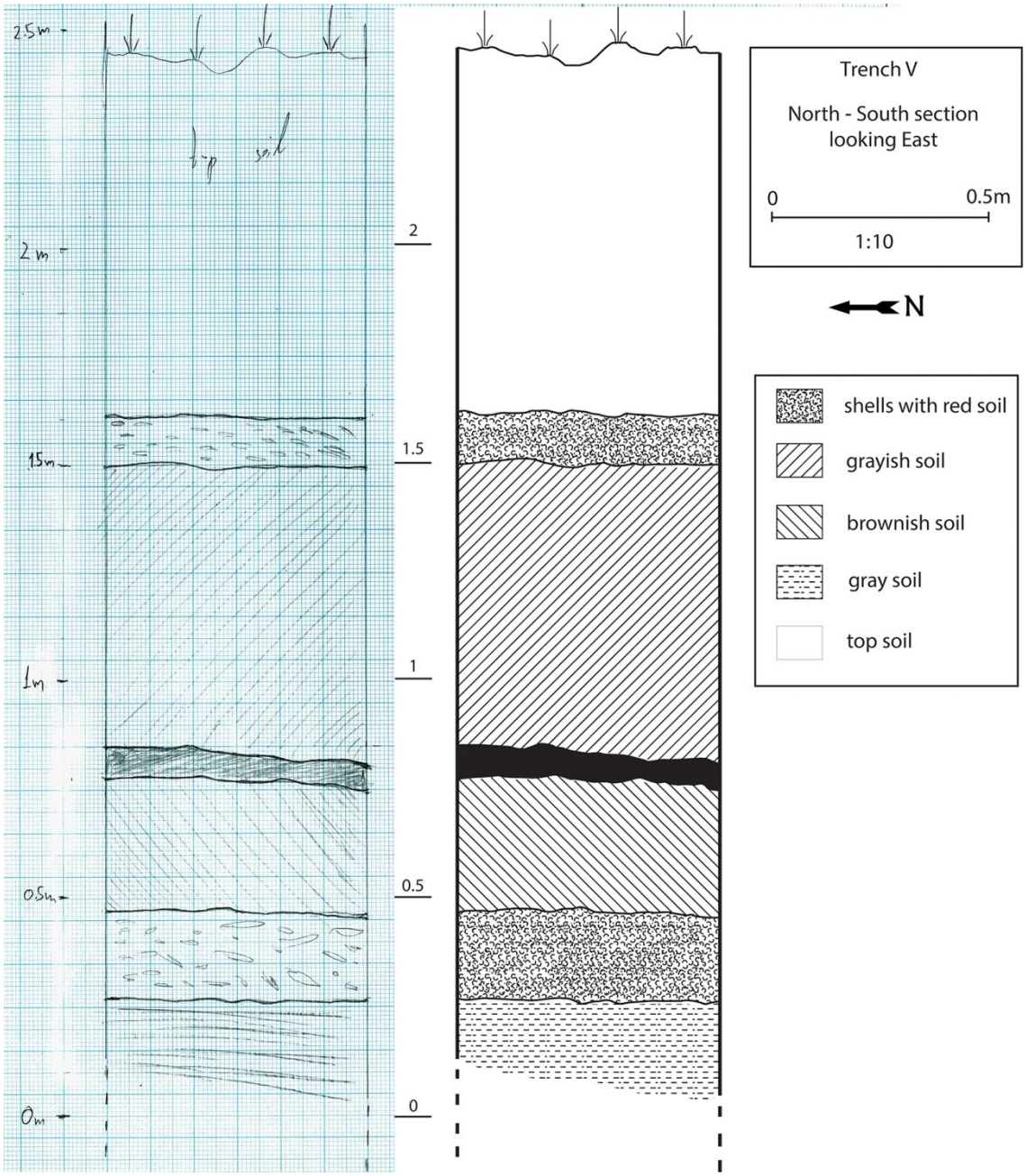

Figure 28 : Area A East Section hand and computer drawn section.

Area B

Area B is comprised of two sub-areas south of Trench 2 (Figs. 29-31). The first, Area B1, was opened immediately south of Trench 2 in order to explore the upper part of the site's stratigraphic sequence (Fig. 32). A few square meters were excavated starting at surface level. The sediment is silty mud containing only a few flint flakes. In light of the poor findings and due to the shortage of time and team members, the excavation here was stopped after some 50 to 70 cm. and will be continued in future seasons.

The second sub-area, Area B2, was opened south of Area B1 on the bank of the Jordan River where a wealth of finds was exposed on the bank (Fig. 33-35). Excavation of the sub-area, 4 square meters in size, exposed a sequence of interchanging coquinas and muds. Archaeological finds were unearthed all along the sequence in varying amounts. In square N997, the primary excavated square, a change in sediment can be seen between the west and east sub-squares (Fig. 35-38). It seems that at the same level, the western sub-squares (a–b) are comprised of red (oxidized), crushed melanopsis sand, while the eastern sub-squares are comprised of a coquina rich with Unia shells and denser in archaeological finds (Fig. 37). This may represent a small-scale change in sediment or, alternatively, the geometry of tilted layers. This phenomenon will be explored in future seasons. The excavation started ca. 40cm above the excavation datum. The sediments are rich in archaeological finds until ca. 10cm above datum level, where the amount of finds seems to decrease (Figs. 37-40). The finds include flint flakes as well as small bones (micro-fauna) including turtle shells. Unlike in Area C (see below) the clay layers here seem to have a lens nature rather than distinct horizons. An important find is a group of limestone cobbles with notches at both lateral margins. These are probably fishing net sinkers (Nadel and Zaidner 2002).

Figure 29 : Area B1 south of Trench 2.

Figure 30 : Area B1 South of Trench 2.

Figure 31 : Area B1 during excavation

Figure 32 : Layers in north section of Trench 2

Figure 33 : Area B2 2014

Figure 34: Area B2 from west.

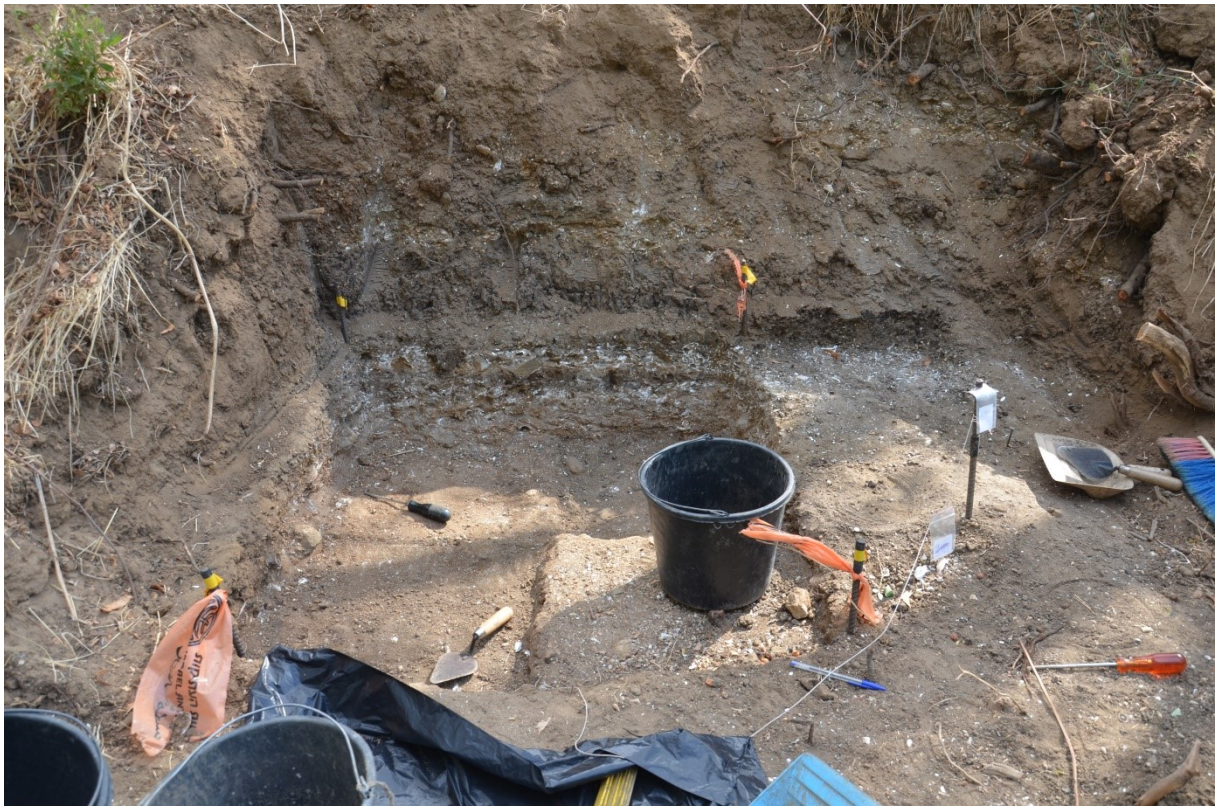

Figure 35: Area B2 during excavation from west.

Figure 36: Area B2 Square N997 sediments and section.

Figure 37: Area B2 Square N997 sediments and section as excavation progress.

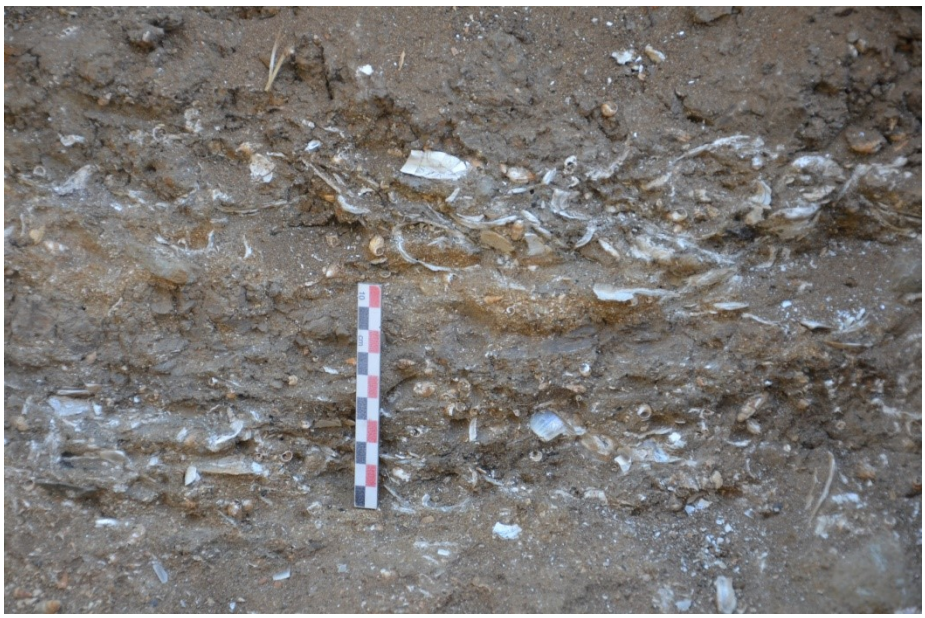

Figure 38: Area B2 Square N997 east section.

Figure 39: Area B2 Square N997 sediments and section. End of excavation 2014.

Figure 40: Area B2 Square N997 Section East end of excavation.

Area C

This small area, consisting of only one square meter in size, Square M986, was opened immediately north of Trench 3 on the bank of the Jordan River (Fig. 41). The trench and excavation area exposed a sequence of coquinas and muds rapidly changing and not more than 10-15 cm in thickness (Figs. 42-46). Within some of the coquinas are the richest archaeological occurrences at the site. Sometimes the flint tools and animal bones appear in clear, rich horizons, single artifact thick, most likely representing an occupation level of the site. These horizons appear only within the coquina layers comprised, typically, of sand rich with melanopsis and unia shells (Figs. 42-43). These layers probably represent a lake margin environment, while the mud layers are probably the result of shallow water accumulation. In some of the layers, very large amounts of small, young mollusks shells were found. This phenomenon was previously discovered in the site layers excavated during the 2002 season (Marder et al. in prep.; Ashkenazi et al. 2006 Unpublished report to the IAA). The tiny mollusks tend to float in water when sieved, clearly indicating that the sediment was not sorted by water, supporting the in situ nature of the layers.

At the base of the section here, at level of c. 30 cm below datum, a thick coquina layer appears, comprised primarily of broken Unia shells (Fig. 47). It should be noted that some of the Unia shells were found complete and with both valves still attached to each other. The implication of this state of preservation for pre and post depositional processes and the site's environment will be tested in the future.

The archaeological finds include numerous flint flakes and tools, most of which are relatively large in this part of the site, and not many microliths (Figs. 44-45 and see below). A few fine baldelet cores were exposed as well as a large basalt scraper exposed next to a flint blade. Charcoal is quite common in these layers. The sediment at the base has the odor of organic decomposer.

Figure 41 : Area C Square M986 at the beginning of excavation.

Figure 42: Area C Square M986 during excavation

Figure 43: Area C Square M986. Flint tools in archaeological horizon

Figure 44: Area C Square M986. Rich archaeological layer in coquina.

Figure 45: Area C Square M986 - Archaeological horizon. Note flint blade and basalt massive scraper found together.

Figure 46: Area C Square M986 end of excavation.

Figure 47 : Area C Square M986 Section East final.

Site preservation and protection

The sediments and archaeological horizons at the banks of the Jordan River are exposed to weathering during the winter flooding of the river's channel. In addition, touristic activity as well as cow herding is causing much damage to any exposed surface. In order to protect the site's layers, all excavated trenches and Areas were covered by sediment at the end of the 2014. The excavated surface was covered with plastic sheet to mark the level of excavation for next season (Figures 48-49).

Figure 48: Area A; B and; C covered by plastic at the end of 2014 excavation season.

Figure 49: Covering archaeological trenches and excavation areas using local sediments. End of 2014 season

The extent of the site and its stratigraphy

The 2014 excavation exposed archaeological layers extending along the river bank for at least 45 meters from north to south. The northern reference point is the outlet of the small Dureijat stream into the Jordan River (Fig. 4). The stream channel here is artificial and was created during drainage operation. The channel is paved with basalt boulders brought in by tractor. This channel was cut into the site layers as can be seen in the sections to the south and north. The bank to the north of the Dureijat Channel is covered by giant basalt boulders. Yet observations made during and immediately after the drainage operation suggest that the archaeology bearing layers do continue toward the north at this point.

At the base of the stratigraphy in most parts of the exposed Jordan River bank is a layer of cobbles-to-boulder sized basalt, probably of fluvial origin. Above this layer is the sequence of coquina and muds within which the archaeological horizons appear (see stratigraphy below). The basalt cobble layer seems to be only some 50 cm thick, at least in some of the exposures, covering a layer of dark mud below it. This fluvial basalt layer is exposed on the river bank from the Dureijat outlet approximately 45 meters to the south. After 45 meters, the basalt layer slants down under the water level and disappears from the exposed

bank. The layers of coquinas and mud continue toward the south but it seems that they are not archaeologically rich here.

The JRD site is restricted by the Jordan River channel. It should be noted that the west bank of the river, only some 8-10 meters from the east bank, is completely different from the east bank. The west bank is comprised of a heavily weathered basalt flow, clearly of much greater age than the Late Pleistocene layers of the east bank. The extent of the site toward the east is yet unknown. Observation at Trench 0 and the eastern section of Trenches 1-3 suggest that the density of archaeological layers decreases toward the east and practically disappears at a distance of 10 meters from the river. Yet much more study is needed before any conclusions can be drawn.

The data collected during the 2014 season has enabled us to establish a general stratigraphic scheme for the site presented below (Fig. 50). At the top of the stratigraphic column is a ca. 1 meter, thick layer of recent sediment, probably laid by the floodplain of the modern Jordan River. Below this layer is a long, ca. 3 meter sequence of changing limmnic and lake shore sediments. The sequence was formed by replacement of mud layers with different coquinas. The sequence was accumulated inside and at the banks of the Paleo-Hula Lake, prior to the creation of the present day Jordan River Channel. The thickness of each mud and coquina layer ranges between 5 and 30 cm (e.g. Fig. 47). The mud layers are interpreted as representing a higher water table in the lake while the mollusk rich layers suggest a lakeshore environment. And indeed, all human activity remains were found primarily within the beach deposits of the site. At the bottom of the sequence here is a fluvial layer of basalt cobbles and boulders, on which the lowermost coquina is laid. Observation at the river bank suggests that the thickness of the basalt layer is only ca. 50 cm. Nevertheless, the basalt cobbles seem to form a “bed rock” layer at the bottom of the sequence. This general stratigraphy is in agreement with the stratigraphy observed during the 2002 survey (Sharon, Marder et al. 2002; Sharon, Feibel et al. 2002; Marder, Biton et al.).

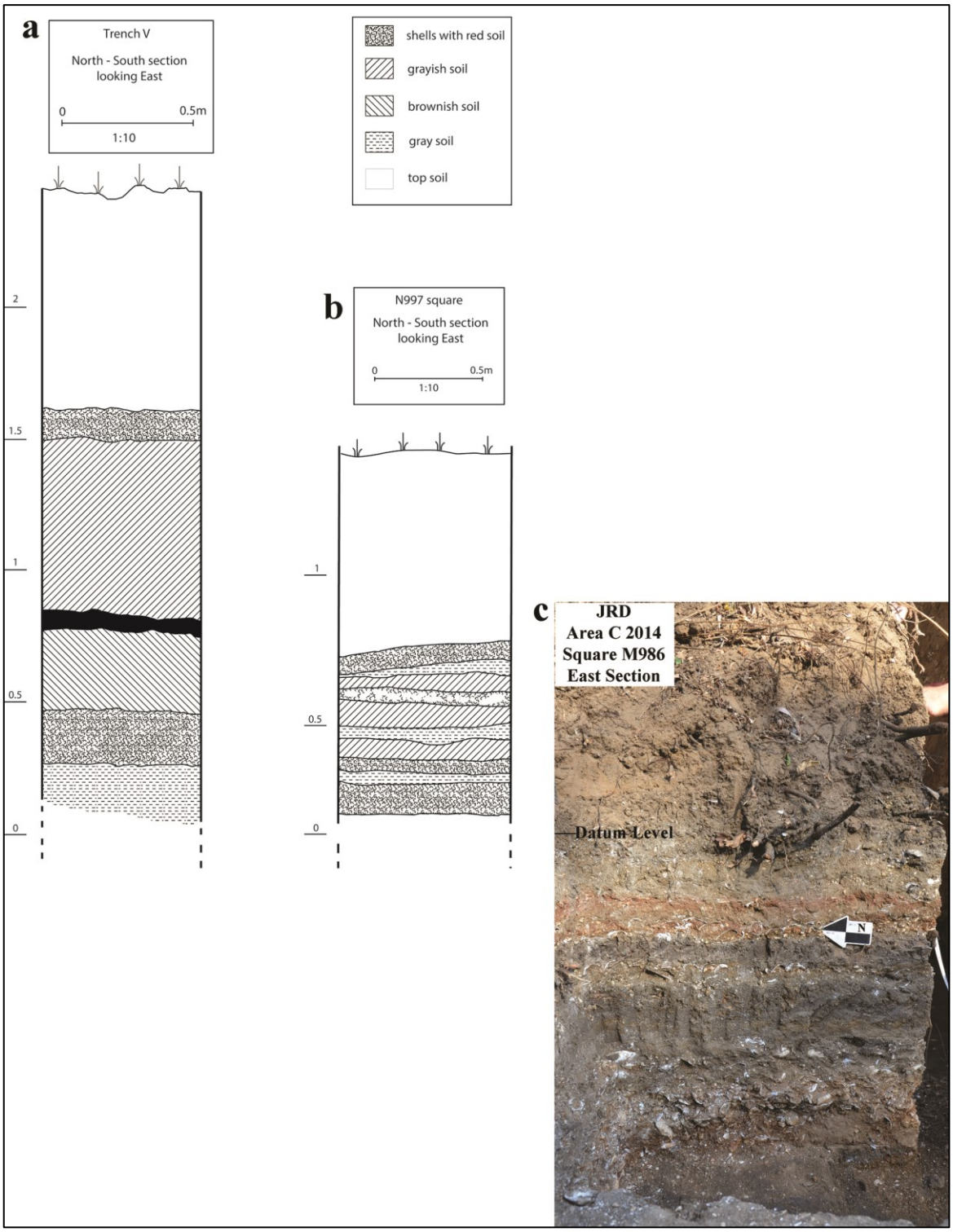

Figure 50: JRD 2014. Combined stratigraphy of the site.

Horizons rich in lithic artifacts as well as bones and charcoal appear in almost all of the lakeshore/coquina layers at the lower part of the stratigraphic sequence. At Area C, for example, at least two rich horizons were exposed in the coquina layers within less than a 40 cm sequence (Figs. 43-44).

While found in a lake shore environment, the *in situ* nature of the deposits could be established due to the following observations:

1) The artifacts are fresh and unrolled, indicating minimal (if any) transportation by water.
2) The lithic material is not sorted by size; both large artifacts and micro-artifacts are present in the same excavation units.
3) Many chips and microliths are present that, together with the numerous cores, suggest knapping activity at the site.
4) The artifacts and bones appear as distinguished horizons representing distinguishable episodes within the accumulation sequence.
5) All of the large artifacts were exposed lying in horizontal position (Fig. 43). This indicates a minimal post-deposition movement of the artifacts.
6) Micro-fauna bones are present in large numbers.
7) The archaeological material is virtually absent from the muddy layers.

The above observations indicate the presence of in situ archaeological horizons that seem to have experienced minimal if any post-depositional movement or disturbance. These observations highlight the potential of the site for future study.

The lithic assemblage

The rich lithic assemblage excavated during the 2014 excavation season at JRD underwent preliminary study to evaluate the typological composition of the assemblage and determine its cultural chronological affiliation. The primary observations from the study of the 2014 assemblage are (Fig. 51):

1) Most of the flint tools are unrolled, although at Area C the lower horizon seems to contain artifacts evidencing a greater state of weathering.
2) In general terms, the lithic industry is flake, not blade dominated. The great majority of the artifacts are not elongated in proportions.

3) Remains of the entire reduction sequence are present within the site's archaeological horizons including cores, core trimming elements (CTE), tools and the smallest chip elements of 1mm in size.

Additional observations including the following: The tools include end-scrapers, some of which are carinated, burins, and retouched flakes. One significant characteristic of the assemblage is the low number of microlithic tools. Early EP sites often contain numerous retouched microliths, which are often used as the primary cultural marker (Bar-Yosef 1970; Goring-Morris 1995). At JRD less than 50 retouched microliths were found (Fig. 51a). The reason for this small number is not a methodological bias (all of the sediments at the site underwent sieving) nor is it the result of post-depositional process, as small chips as well as micro-fauna bones are present in the site layers. It seems that the nature of the site is such that microliths were not abandoned.

Nonetheless, the number of microliths is sufficient to draw some preliminary conclusions: the site can be assigned to the Kebaran lithic tradition. Not a single geometric microlith was observed. Most of the microliths are backed by steep retouch and are very narrow (Fig. 51a). Finds from the drainage piles of sediments and an earlier test excavation suggest that an additional cultural stage may be represented in the site's layers (Sharon, Marder, et al. 2002; Sharon, Feibel et al. 2002; Marder, Biton et al.). The 2014 excavation season focused on the lower part of the site's sequence, where the lithic assemblage seems to fall entirely within a single stage of the Epi-Paleolithic cultural sequence, namely the Kebaran lithic tradition. Clearly, further excavation is needed before the question of cultural stages can be answered.

Non-flint tools exposed include basalt tools (scrapers and flakes; Fig. 45 & 51b), basalt grinding elements (pestles, fragments of grinding stones) and limestone artifacts. The most common limestone artifacts are cobbles notched on both lateral edges (Fig 51b). These were identified as fishing net sinkers (Nadel and Zaidner 2002), yet their large size at JRD suggests a more complex explanation for these tools. Of special interest is a double end-scraper produced on a blade showing pronounced shine at the middle of both lateral edges (Fig. 51c). This strange implement may suggest a unique hafting technique or intensive harvesting of cereals using an unusual method.

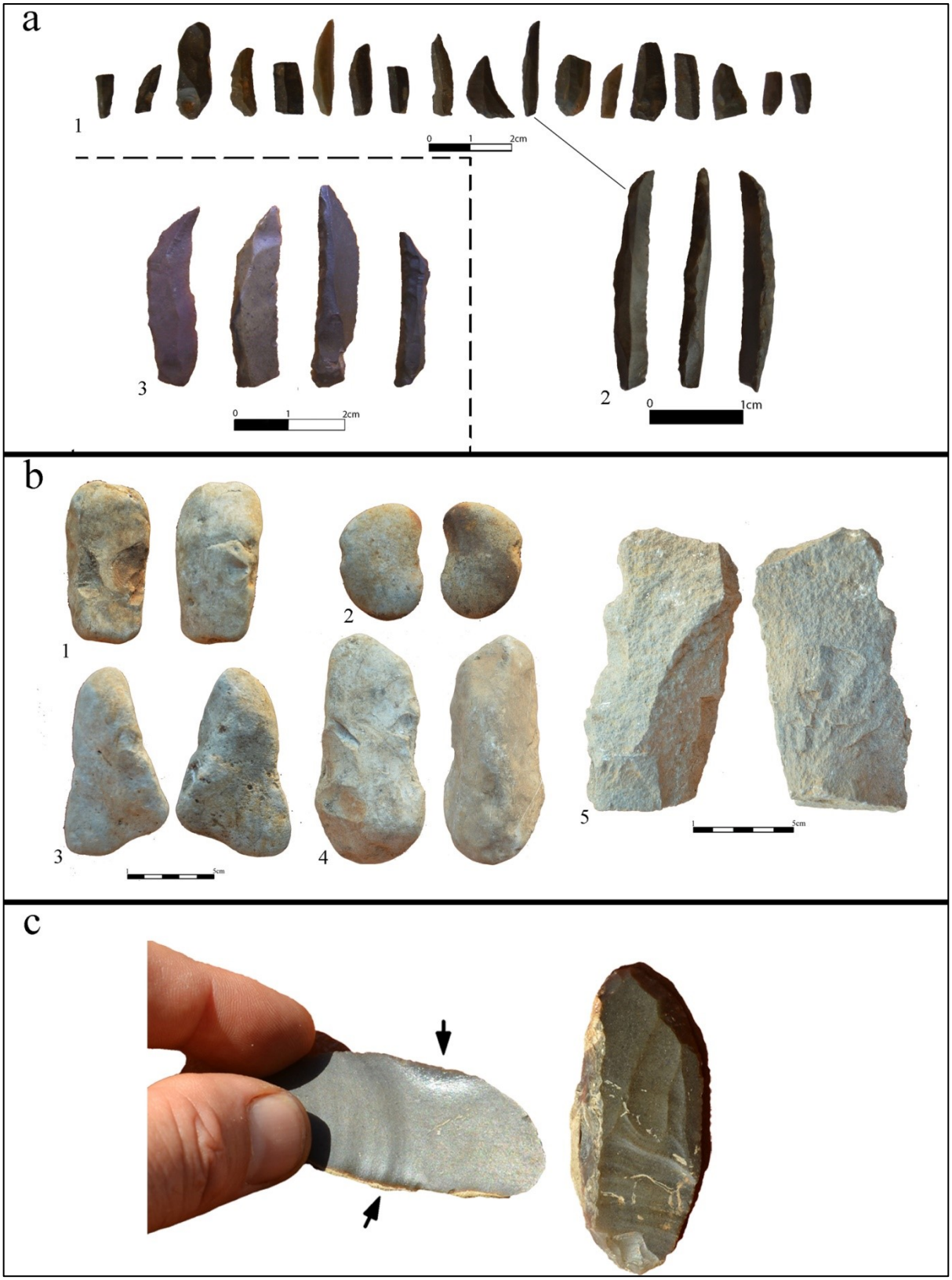

Figure 51: JRD 2014 lithic assemblage

The nature of the site and archaeological horizons

The 2014 season exposed a sequence of rich, in situ archaeological horizons spread along more than 45 meters of river bank and penetrating eastward into the bank. The excavation exposed only a small area (ca. 8 square meters in 3 excavation areas; Fig. 4) yet the trenches dug into the bank revealed the continuation of the archaeological layers eastward into the bank indicating an extensive site . No features (e.g. structures, hearth, burial) were identified during the 2014 season, yet the intensity of finds, the large number of burned flints and evidence for non-flint lithic industry, and rich faunal collection with evidence of human modification, all indicate a significant, probably repeated human presence at the shore of the Paleo-Hula Lake. Additional, large scale excavation is needed in order to define the nature of the site. Was it a series of small, short-term camps on the banks of the lake? Or will more extensive occupation be exposed when a large surface is excavated? Perhaps we are looking at a different type of site from the camp site of Ohalo II (Nadel and Werker 1999; Nadel 2003; Nadel et al., 2012) or the aggregation site of Kharaneh IV (Maher et al. 2012), a site that will provide a new view of the complexity and variety of hunter-gatherer exploitation of landscape during this poorly understood period.

References

Aharonovich, Sophia, Gonen Sharon, and Mina Weinstein-Evron
2014 Palynological investigations at the Middle Palaeolithic site of Nahal Mahanayeem Outlet, Israel. *Quaternary International* 331: 149–166.

Ashkenazi, Shoshana, Henk Mienis, and Gonen Sharon
2006 *The freshwater and land mollusc assemblage of the Epipaleolithic site of Gesher Benot Ya'aqov*. Unpublished Report to the Israel Antiquity Authority, Jerusalem.

Bar-Yosef, Ofer
1970 The Epi-Paleolithic Cultures of Palestine. Hebrew University, Jerusalem.

Belitzky, Shmuel
1987 Tectonics of the Korazim Saddle. Hebrew University, Jerusalem.

Belitzky, Shmuel
2002 The Structure and Morphotectonics of the Gesher Benot Ya'aqov Area, Northern Dead Sea Rift, Israel. *Quaternary Research* 58(3): 372–380.

Goren-Inbar, Naama, Erella Werker, and Craig S Feibel
2002 *The Acheulian Site of Gesher Benot Ya'aqov, Israel: The Wood Assemblage*. Vol. 1. Oxbow Books, Oxford.

Goren-Inbar, Naama, Craig S Feibel, Kenneth L Verosub, Yoel Melamed, Mordechai E Kislev, Eitan Tchernov, and Idit Saragusti
2000 Pleistocene milestones on the Out-of-Africa corridor at Gesher Benot Ya'aqov, Israel. *Science* 289(5481): 944–947.

Goren-Inbar, Naama, A. Lister, Erella Werker, and Mario Chech
1994 A butchered elephant skull and associated artifacts from the Acheulian site of Gesher Benot Ya'Aqov, Israel. *Paléorient* 20(1): 99–112.

Goring-Morris, A N
1995 Complex Hunter-Gatherers at the End of the Paleolithic (20,000 - 10,000 B.P.). In *The Archaeology of Society in the Holy Land*, edited by T E Levi, pp. 141–164. Leicester University Press, London.

Kalbe, Johannes, Gonen Sharon, Naomi Porat, Chengjan Zhang, and Steffen Mischke
2014 Geological Setting of the Middle Paleolithic Site of NMO (Upper Jordan Valley, Israel). *Quaternary International* 331: 139–148.

Maher, Lisa A, Tobias Richter, Danielle Macdonald, Matthew D Jones, Louise Martin, and Jay T Stock
2012 Twenty Thousand-Year-Old Huts at a Hunter-Gatherer Settlement in Eastern Jordan. *PLoS ONE* 7(2): e31447.

Marder, Ofer, Shoshana Ashkenazi, Yoel Melamed, Rivka Rabinovich, Rebecca Biton, Craig Fiebel, and Gonen Sharon
Human presence and paleoenvironment at the Epi-Palaeolithic site at Gesher Benot Yaaqov .

Marder, Ofer, Rebecca Biton, Elisabetta Boaretto, Craig S. Feibel, Yoel Melamed, Henk K. Mienis, Rivka Rabinovich, Irit Zohar, and Gonen Sharon
Hunter-Gatherers at the Brink of Sedentism: A new Epipaleolithic site in the Upper Jordan Valley. *PaleoAnthropolgy*.

Melamed, Y
1997 Reconstruction of the Landscape and the Vegetarian Diet at Gesher Benot Ya'aqov Archaeological Site in the Lower Paleolithic Period. Bar-Ilan University, Tel-Aviv.

Melamed, Yoel, Mordechai Kislev, Ehud Weiss, and Orit Simchoni
2011 Extinction of water plants in the Hula Valley: Evidence for climate change. *Journal of human evolution* 60(4): 320–7.

Nadel, D
2003a The Ohalo II brush huts and the dwelling structures of the Natufian and PPNA sites in the Jordan Valley. *Archaeology, Ethnology and Anthropology of Eurasia*.

Nadel, D, DR Piperno, I Holst, A Snir, and E Weiss
2012 New evidence for the processing of wild cereal grains at Ohalo II, a 23 000-year-old campsite on the shore of the Sea of Galilee, Israel. *Antiquity*.

Nadel, Danny, and Erella Werker
1999 The oldest ever brush hut plant remains from Ohalo II, Jordan Valley, Israel (19,000 BP). *Antiquity*.

Nadel, Danny, and Yossi Zaidner
2002 Upper Pleistocene and Mid-Holocene net sinkers from the Sea of Galilee, Israel. *Journal of the Israel Prehistoric Society* 32: 49–71.

Nadel, Danny
2003b The Ohalo II Flint Assemblage and the Beginning of the Epipalaeolithic in the Jordan Valley. In *More than meets the eyes: studies on Upper Palaeolithic diversity in the near east*, pp. 216–229.

Sharon, Gonen, Craig S Feibel, Shmuel Belitzky, Ofer Marder, Hamoudy Khalaily, and Rivka Rabinovich
2002 1999 Jordan River Drainage Project Damages Gesher Benot Ya'aqov: A Preliminary Study of the Archaeological and Geological Implications. In *Eretz Zafon - Studies in Galilean Archaeology*, edited by Zvi Gal, pp. 1–19. Israel Antiquities Authority, Jerusalem.

Sharon, Gonen, Ofer Marder, and Elisabetta Boaretto
2002 A Note on14C Dates From the Epi-Paleolithic Site at Gesher Benot Ya'aqov. *Mitekufat Haeven - Journal of the Israel Prehistoric Society* 32: 5–15.