Middle Palaeolithic find spots with Nubian cores from the Southern Negev and the Arava, Israel

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Abstract:

This is a report of results from a cursory survey of several Middle Paleolithic find spots from the Arava, Israel, conducted as part of a broader collaboration between the Dead Sea and Arava Science Center and the Israel Antiquities Authority. A series of find spots were recorded on the eastern flanks of the Zehiha hills and on the northern terraces of Wadi Paran. These finds consist of mostly Middle Paleolithic artifacts including Levallois centripetal, bidirectional and Nubian cores. The presence of Nubian cores within this technological constellation is of interest in light of recent discussions regarding archaeological markers of modern human dispersals out of Africa and feasible routes into Eurasia and Arabia. The Nubian core technology, a specific variant of the Levallois technology is found within a defined and continuous geographic region and is perceived as penecontemporaneous. Sites with a similar technological package are found to the east at Al-Jawf, within the Arabian Peninsula, as well as to the North-West, within the central Negev highlands, at the localities of Har Oded and H2. The distinctive technological characteristics, geographical extent and chronology advocate its use as a possible marker for human dispersals and interactions between Eastern Africa, the Nile Valley, the southern Levant and Arabia.

Keywords: Nubian technology; Middle Paleolithic; Southern Levant; surface sites; Out of Africa; dispersals

1. Introduction

The Nubian technology is a specific variant of the Levallois technology (Goder-Goldberger *et al.* 2016, Guichard & Guichard 1965; 1968; Usik *et al.* 2013; Van Peer 1992) found within Middle Paleolithic techno-complexes at surface sites across the western High Desert in Egypt (Chiotti *et al.* 2009; Olszewski *et al.* 2005), the central Negev highlands

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(Goder-Goldberger *et al.* 2016) and Arabia (Crassard & Hilbert 2013; Hilbert et al. 2016; 2017; Rose *et al*. 2011; Usik *et al.* 2013). Common to these finds is a technological package composed of the Levallois Nubian technology alongside both Levallois centripetal and bidirectional modes of production. Although sparse, all dated assemblages containing Nubian technology are assigned to MIS5 (Mercier *et al.* 1999; Rose *et al.* 2011; Schmidt *et al.* 2015; Van Peer & Vermeersch 2007; Van Peer *et al.* 2010). The distinctive technological characteristics, geographical extent and chronology advocate using the Nubian technology as a possible marker for human dispersals and interactions between Eastern Africa the Nile valley the southern Levant and Arabia (Crassard & Hilbert 2013; Goder-Goldberger *et al.* 2016; Hilbert *et al.* 2017; Rose *et al.* 2011; Usik *et al.* 2013).

The objective of this paper is to report on two new localities, composed of several find spots, with Middle Paleolithic finds including Nubian cores. The localities; Nahal Paran 9 and Nahal Zihor 6, are situated within the Paran plains in the Arava (Figures 1 and 2). These find spots were discovered during a cursory survey conducted in the Arava region by Dead Sea and Arava Science Center (DSASC) and the Israel Antiquities Authority (IAA). The Arava today is a hyper arid environment cut by dry waterways and covered by desert pavements (Avni *et al.* 2011; Ginat 1997), although evidence for periods of higher levels of humidity and semi-desert conditions are present (Ginat *et al.* 2003; Waldmann *et al.* 2010). The findings from these two localities bridge a gap in the geographical extent between the Negev Highland and central Arabia adding data to the ongoing of recent discussions regarding archaeological markers of modern human dispersals out of Africa and feasible routes into Eurasia and Arabia (Breeze *et al.* 2016; Goder-Goldberger *et al.* 2016; Groucutt *et al.* 2015; Hilbert *et al.* 2017).

1.1. Technological background

The Levallois reduction system is recognized as a technological marker of Middle Paleolithic industries. This technology has been used at sites in varying environmental settings thousands of kilometers apart and across a vast time span (Goren-Inbar & Belfer-Cohen 1998; Rots & Van Peer 2006; Shea 2003; 2006; Villa *et al.* 2005). The Levallois technology, is defined by a basic technological recipe (as defined by Boëda 1988), involving two main methods; preferential for the removal of a single predetermined end product and recurrent for the removal of a series of predetermined flakes from a given flaking surface (Boëda 1988; 1995; Bordes 1961). A Levallois core is defined by a planimetric mode of exploitation, while maintaining a hierarchy between the flaking and shaping surfaces of the core (Bordes 1961). End products are determined by the organization of core geometry and surface topography resulting in three main morphotypes; flakes, points and blades (Van Peer 1992).

Nubian Levallois technology was initially suggested to represent a technological component found within different local lithic industries confined geographically to the Nile Valley and Nubia (Guichard & Guichard 1965; Marks 1968; Van Peer 1992). The Nubian flaking system is unique and includes identifiable cores, preparation blanks and end products. Nubian cores are defined by four main technological traits (Usik *et al*. 2013); a steep distal ridge, an opposed striking platform, a triangular or semi-triangular shape, and a prepared main striking platform. (For further discussion see Goder-Goldberger *et al.* 2016 and Usik *et al.* 2013).

1.2. Geographic and climatic background

The study area is located within the Paran plains, situated between the central Negev highlands in the northwest to the Dead Sea rift in the east (Figure 2). The southern Negev is drained by Nahal Zihor, Nahal Hiyyon and Nahal Paran, all of which flow into the central

Arava Valley. Geologically, this area consists mainly of marine sedimentary rocks of Cretaceous and Tertiary age. Limestone of Cenomanian-Turonian Judea Group is exposed along the uplifted margins of the southern Arava Valley and in the Zenifim anticline, of which the Zehiha hills are part of (Figure 2). Chalk, chert and marl of the Senonian-Paleocene Mount Scopus Group dominate the structural depression between the Zenifim anticline and the uplifted Arava margin, while Eocene chalk of the Avdat Group is found mainly in the northern part of the area. Extensive areas within the drainage basins of Nahal Paran, Nahal Hiyyon and Nahal Zihor are mantled by fluvial-lacustrine sediments of the Pliocene Arava Formation. These sediments where deposited by a regional fluvial system which drained the southern Negev, eastern Sinai, and part of the eastern margins of the rift, flowing northward to the Dead Sea (Avni 1998; Avni *et al.* 2001; Ginat 1997; Ginat *et al.* 2003).

Figure 1. Regional map, noted are Middle Paleolithic sites with Nubian technology, the research area is marked by the black rectangle

The climate in the area is extremely arid. The mean annual precipitation is 50 mm, usually falling in a few rainfall events per year. Past climatic records indicate that during glacial and interglacial periods between MIS 6 and MIS 4 the central Negev was mostly dry (Amit *et al.* 2006; Vaks *et al.* 2007), whereas short humid episodes (Negev Humid Periods,

NHP), possibly resulting from a northern shift of the African Monsson system, occurred during interglacial times (Blome *et al.* 2012; Kutzbach & Liu 1997; Larrasoaña *et al.* 2013; Torfstein *et al.* 2015; Vaks *et al.* 2010). The last of the NHP (NHP-1) is dated to 142-109 ka and was synchronous with pluvial periods in the Sahara, the Egyptian Desert and the Arabian Peninsula (Osborne *et al.* 2008; Osmond & Dabous 2004; Petit-Maire *et al.* 2010; Rosenberg *et al.* 2011; 2012; Yehudai *et al.* 2017; Vaks *et al.* 2006; 2007; 2010). Terrestrial corridors between the Negev and Arabia, along which there were sufficient water sources, have been suggested to exist during MIS5 (Breeze *et al.* 2016).

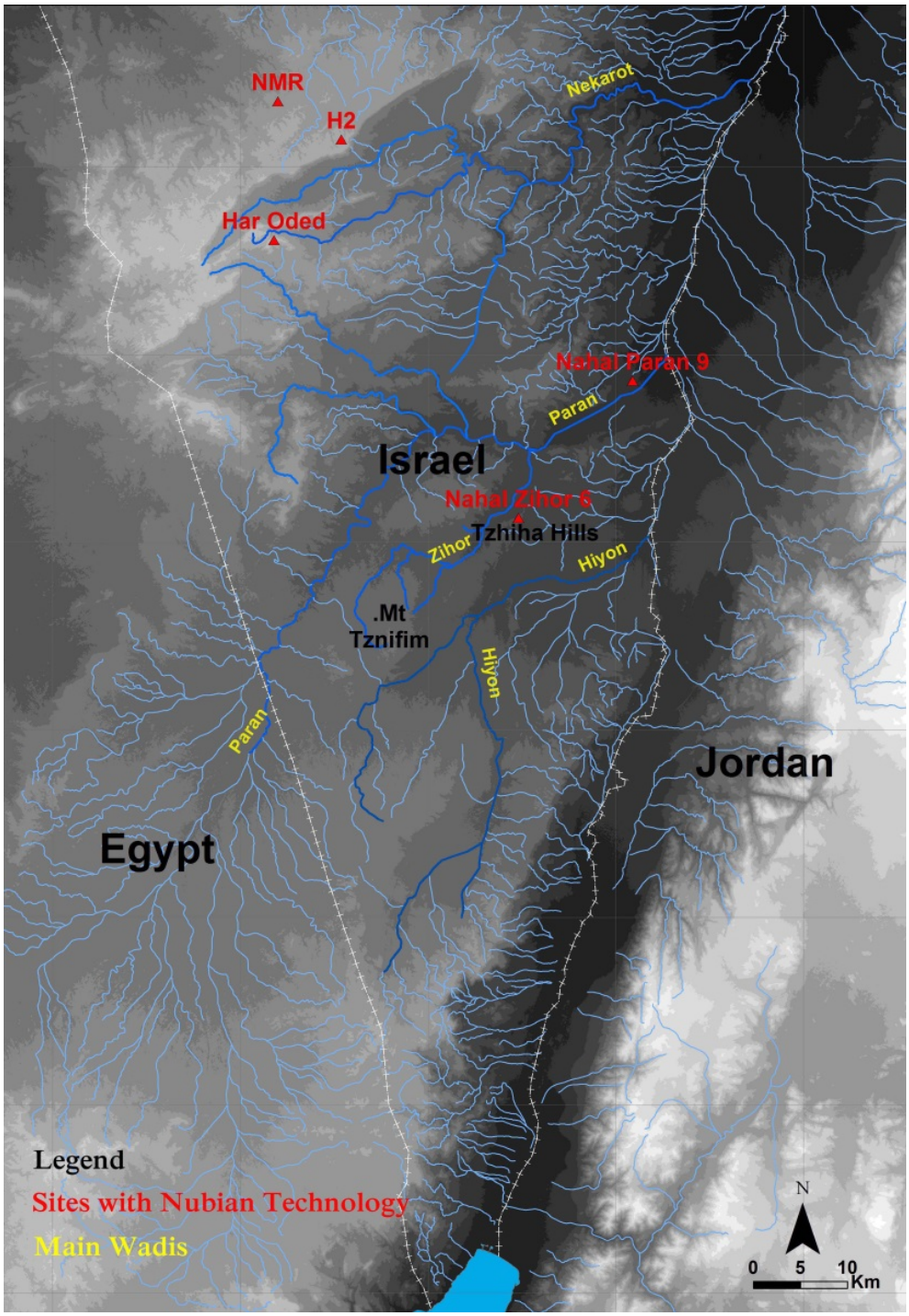

Figure 2. Map of the main wadis and their tributaries in the central Negev and Arava (marked as a rectangle on previous map). In red are Middle Paleolithic surface sites with Nubian technology.

2. The localities

Nahal Zihor 6 (Figure 2) is situated South of Nahal Zihor on the eastern fringe of Zehiha hills, at an elevation of 360 m above sea level (ASL). The Zehiha hills are the main water divide between the drainage basins of Nahal Zihor and Nahal Hiyyon. Nahal Paran 9 is comprised of several separate finds spots on a desert pavement at an elevation of 115 m ASL, north of Wadi Paran, the largest drainage basin in the study area.

2.1. Nahal Zihor 6 (IAA No. 51964/0)

This find spot covers an area exceeding 200 m^2 and is spread across the top of the eastern Zehiha hills (Figure 3).

Figure 3. General view of the desert pavements on the top of Zehiha hills.

Within the area surveyed numerous concentrations of Middle Paleolithic artifacts were noted. Field observations indicate that all artifacts in these concentrations were produced by Middle Paleolithic technologies. Nubian cores (Figure 4a,b) were found in association with centripetal and bidirectional Levallois cores. Some of the scatters were composed of both cores and debitage, while others were mostly composed of cores. Of special note is the presence of large thin flint slabs that were used as Levallois cores, mostly for centripetal recurrent flaking (Figure 4b and 5). These cores are 30-40 cm in length and only a few cm thick. While no cortex appears on the flaking surface, the preparation face is covered almost entirely by cortex, with only small preparation flakes removed from the circumference of the face. Only a handful of artifacts were collected for scanning (Figure 5) from this site thus the ratio between Nubian core and other Levallois and non Levallois cores at this find spot is not available.

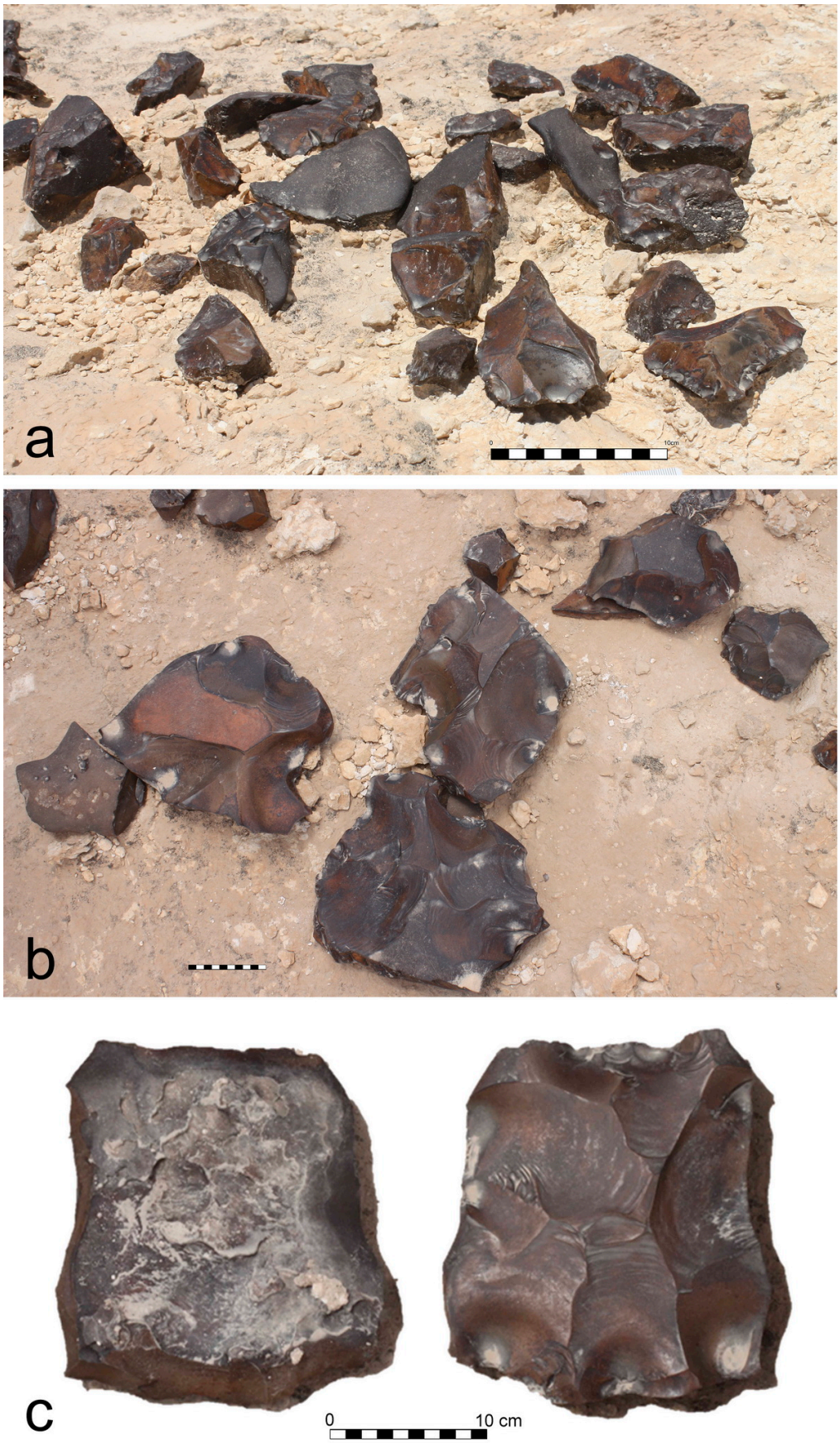

Figure 4. Nahal Zihor 6 a) Close look at one of the artifact concentrations from the Zehiha hills. Notice the Nubian core in the center of photo. b) A second concentration with large Levallois cores on thin flint slabs. c) Large Levallois plaque core. Scale bars are 10 cm wide, divided into 1 cm sections.

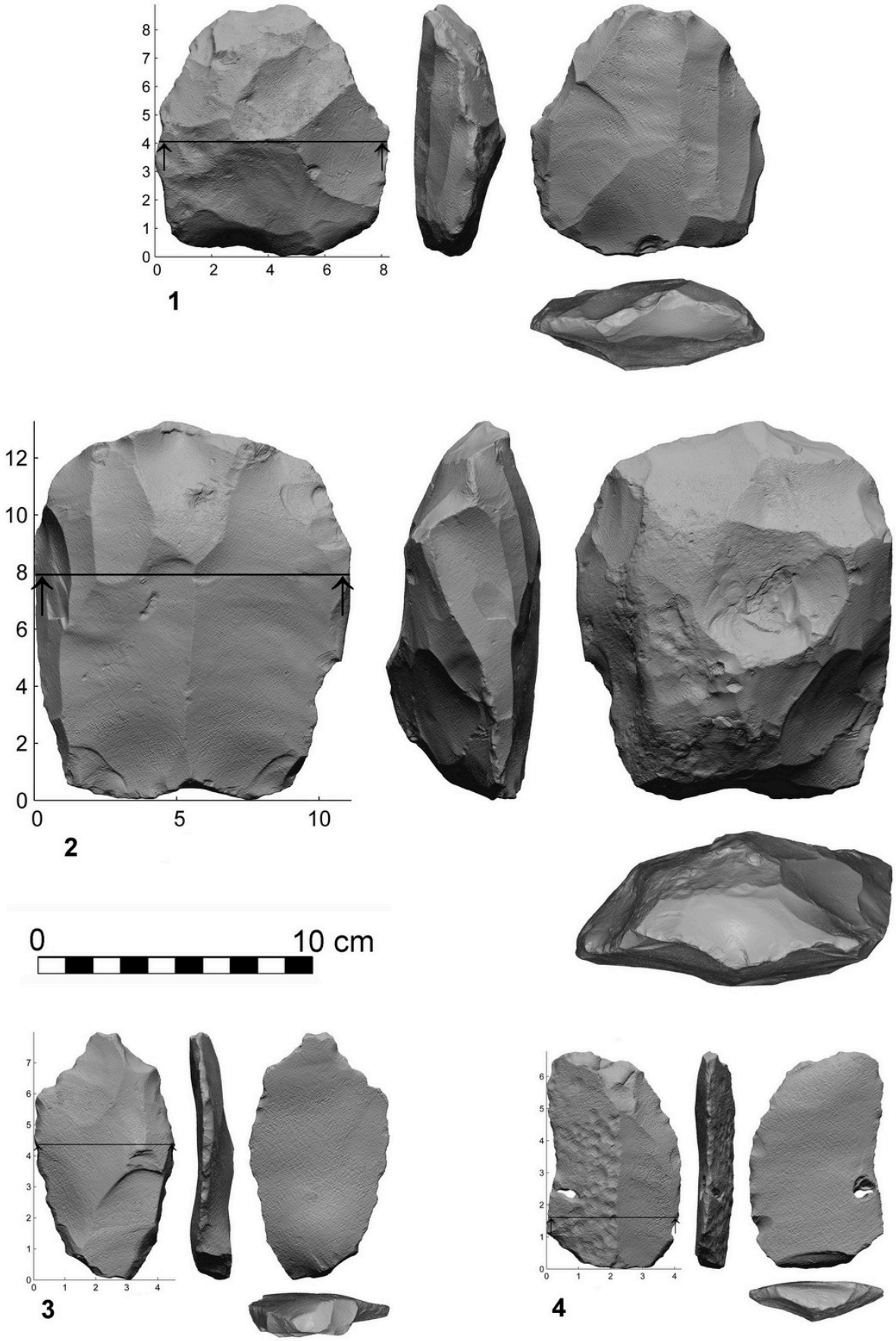

Figure 5. Nahal Zihor 6 - 3D scans of artifacts - 1,2 Levallois cores, 3,4 Large flakes.

2.2. Nahal Paran 9 (IAA No. 51965/0)

On the Northern terraces of wadi Paran there is a desert pavement comprised mostly of Eocene flint nodules (Figure 6a). Amongst the spread of natural flint nodules there is an abundance of anthropogenically modified flints, mostly Middle Paleolithic artifacts (Figure 6b).

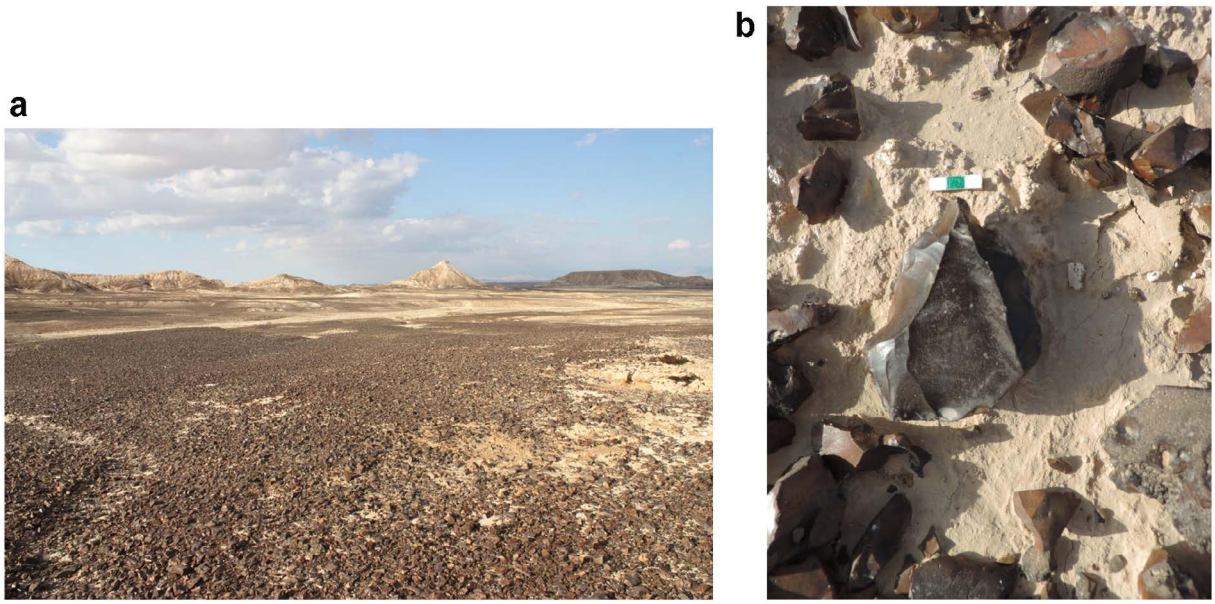

Figure 6 a) View North across the desert pavement adjacent to wadi Paran. b) A Nubian core within the desert pavement. The scale bar is 3 cm wide divided into 1 cm sections.

At Nahal Paran 9 three find spots were marked less than 200 m apart. In the course of the initial survey 11 Levallois cores (Table 1, Figure 7: 2-12 and Figure 8:1-3) and one Levallois point were randomly collected.

Table 1. Dimensions of collected cores from Nahal Paran 9.

Core ID numbers	Length (mm)	Width (mm)	Thickness (mm)	Distal ridge angle	Length of last dominant scar (mm)
Centripetal preferential					
346-2	114.8	110.6	33.8		101.2
346-5	114.6	116.5	45.6		77.7
346-4	113.7	103.3	28.3		88.1
346-7	110.1	93.3	27.7		101.4
Bidirectional preferential					
346-1	107.1	90.3	29.7		79.6
346-6	105.5	105.7	41.5		72.8
Nubian Type I					
346-3	133.6	103.1	26.1	80°	111.1
344-1	130.1	103.4	40.7	70°	92.6
345-1	111.3	89.4	45.4	80°	84.4
Nubian Type II					
344-2	104.6	105.7	38.2		94.9

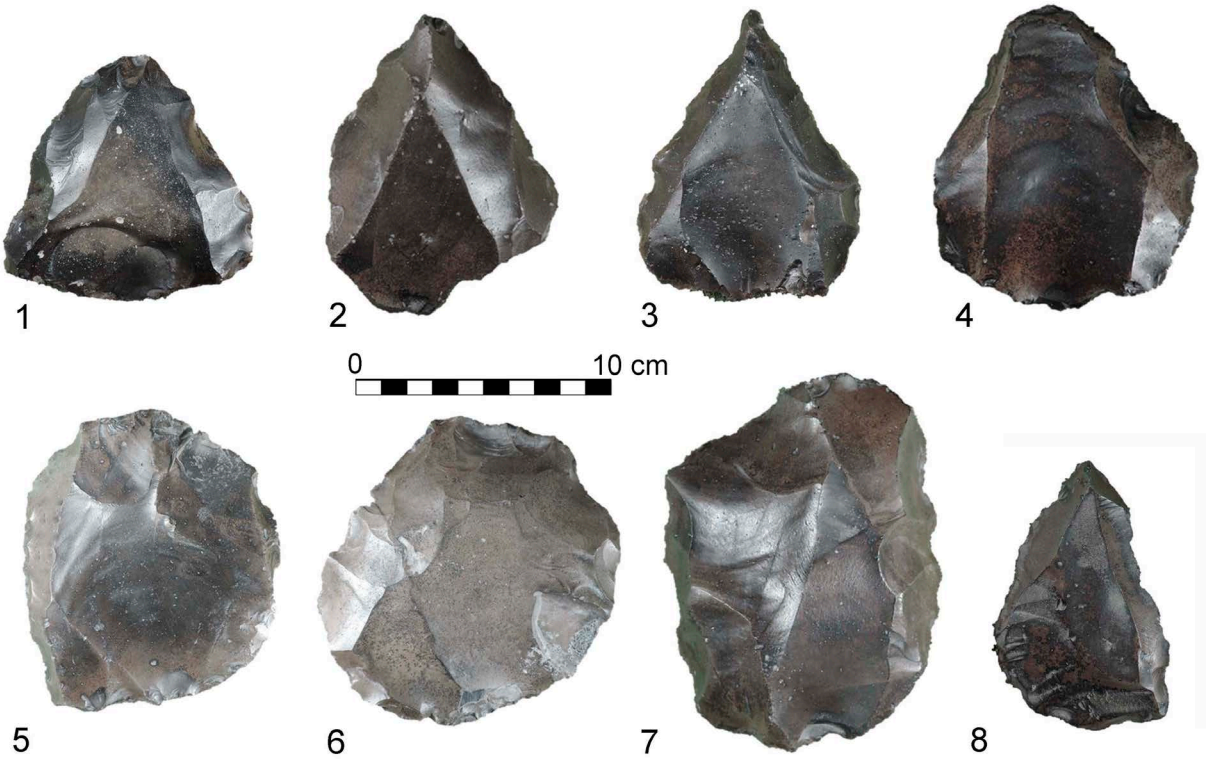

Figure 7. Selected artifacts from Nahal Paran 9: 1, Nubian Type II core (1-344_2), 2-3 Nubian Type I cores (2-345_1; 3-344_1), 4-6 Levallois centripetal preferential cores (4-346_7; 5-346_4; 6-346_5), 7 Levallois bidirectional preferential for a point (346_1). 8, Levallois or Nubian point (346_8).

Length was measured along the axis of the last dominant scar on the flaking surface. Width was measured perpendicular to the length at the widest point. The ridge angle for Nubian cores was measured following Usik *et al.* (2013). Two of the Nubian cores are the largest and all the Nubian cores display semi-steep Angles of the medial distal ridge (Table 1).

To allow an estimation of assemblage densities at Wadi Paran 9 find spots an area of 10x10m was marked and all cores visible within this area were counted and typologically defined. The average distribution of cores at Nahal Paran 9 is low (0.37 cores per m^2). As this was only an initial exercise, none of the cores were collected. Of the 37 cores noted 26 were Levallois, and 11 were multifaceted non Levallois cores. The Levallois technology cores include Nubian cores, as well as centripetal, bidirectional and bidirectional point cores. All the cores recorded seem to belong to Middle Paleolithic industries, as they exhibit a planimetric exploitation of the cores' surfaces.

3. Discussion

Within the initial survey conducted, several Middle Paleolithic scatters with Nubian and Levallois centripetal cores were recognized. Two such localities are Nahal Zihor 6 and Nahal Paran 9. The core scatters from these two find spots typologically resemble the Negev Highland assemblages (Goder-Goldberger et al. 2016), as well as the core type combinations reported from the Al-Jawf region in Arabia (Hilbert *et al.* 2016: 2017). The cores collected and analysed from Nahal Paran 9 (Table 1) are typologically comparable to those found at H2 and Har Oded, two Middle Paleolithic surface sites located some ~50 km North West of the Paran plains, in the central Negev (Figure 2). Nubian and Levallois centripetal core dimensions from Nahal Paran 9 are larger than the same core types from sites H2 (Goder-

Goldberger *et al.* 2016: Table 4) and Har Oded (Boutié & Rosen 1989: Tables 9 and 11), albeit they are wider.

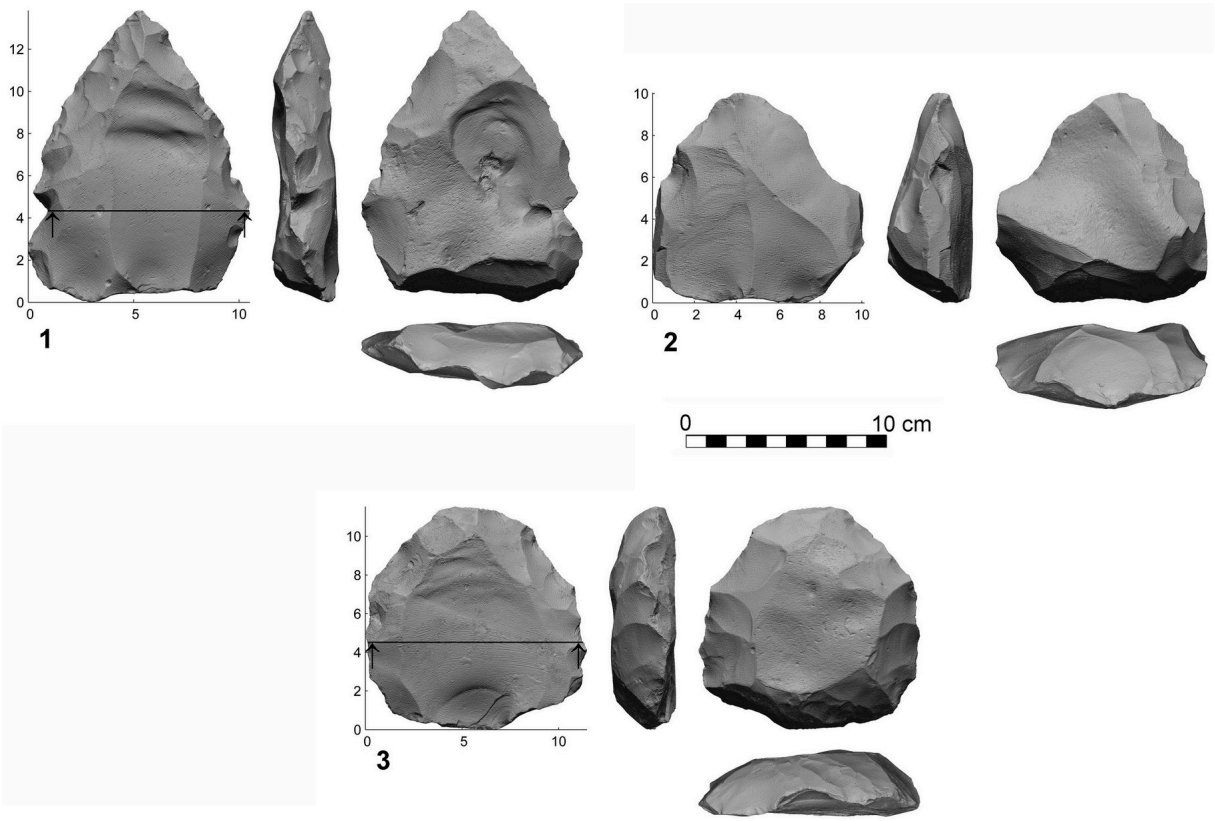

Figure 8. 3D scans of artifacts from Nahal Paran 9 - 1, Nubian core (346_3), 2, Levallois bidirectional preferential core (346_6), 3, Levallois centripetal preferential (346_2).

For Nahal Paran 9 only core distribution was recorded and when compared to other sites it is relatively low. The average core density at Nahal Paran 9 is 0.37 cores per m^2, while at Har Oded, the average density is 2 cores per m^2 (Boutié & Rosen 1989). In the Al Jawf region, Arabia, artifact densities amounted to 1-4 artifacts per m^2 (Hilbert *et al.* 2017), while the surveyed localities on the Abydos plateau, Egypt have an average density of 3.49 artifacts per m^2, with the maximum density reported for a single locality of 144.83 artifacts per m^2. Localities with the highest artifact densities appear on the ridges adjacent to the central wadi system (Olszewski *et al.* 2005).

Nahal Paran 9 and Nahal Zihor 6 localities are found in the relatively concise geographic area in which the Nubian technology incorporating the reduction of Nubian cores is found (Goder-Goldberger *et al.* 2016; Hilbert *et al.* 2017; Hussain *et al.* 2015; Rose *et al.* 2011;Van Peer & Vermeersch 2007). Within this arid region movements of hunter-gatherer groups across the landscape were most likely facilitated by climatic wet phases. In central Arabia these wet phases are documented in fluvial-lacustrine archives (Breeze *et al.* 2016; Crassard *et al.* 2013; Groucutt *et al.* 2015; Rosenberg *et al.* 2011; 2012). Negev Humid periods (NHP) are recorded in speleothems (Vaks *et al.* 2006; 2007; 2010). Paleoenvironmental data indicate that widespread pluvial phases across Arabia occurred during MIS 5e (128-120 ka), MIS 5c (110-100 ka) and MIS 5a (90e74 ka) (Parker 2009; Petraglia *et al.* 2012; Rosenberg *et al.* 2011; 2012; Yehudai *et al.* 2017).The last humid period in the Negev (NHP-1) corresponds to both MIS5e and MIS5c (Vaks *et al.* 2007; 2010).

Convergence, dispersal, diffusion and diffusion with modifications can all be used to explain technological similarities between different regions (Goder-Goldberger *et al.* 2016;

Hilbert *et al.* 2016; Groucutt *et al.* 2015; Will *et al.* 2015). Due to the restricted sample size and lack of chronological control over the surface scatters the two localities can, within the regional context, only cautiously be suggested to indicate events of dispersal or diffusion, or a combination of both, rather than convergence. Mechanisms of dispersal and diffusion operate across continuous geographical regions and time periods, and as a result are difficult to isolate in archaeological material culture. Examples for technological convergence may be suggested by the presence of Nubian-like cores in South Africa (Hallinan & Shaw 2015; Will *et al.* 2015) and the Indian Thar desert (Blinkhorn *et al.* 2013). These two regions represent both geographical and chronological discontinuity with the region consisting of East Africa, the Nile Valley, the Negev desert and Arabia.

For a group of hunter-gatherers to disperse across geographical regions the landscape must be legible to them (Guiducci & Burke 2016). Water ways have been shown to facilitate movement of populations (Breeze *et al.* 2016; Scerri *et al.* 2013). The ability to read the landscape and recognize landmarks allows them to find routes which can be retraced, and thus re-used over time. Wadi Paran and Wadi Zihor are two such landmarks which would enable easy traveling across the landscape to and from the Negev highlands and the Arava. Wadi Paran drains an area of more than 3800 km^2 from eastern Sinai and the southern Negev towards the Dead Sea. This wadi could have acted as a path way allowing passage across the Arava to and from Arabia, the Negev highlands and the Mediterranean coast.

4. Conclusions

In this paper we presented finds from a cursory survey of several Middle Paleolithic find spots from the Arava, Israel. An attempt has been made to point out the relevance of these finds to those in a wider area including central Arabia and the Negev highlands. Similarities are revealed in the presence of Levallois Nubian cores alongside both Levallois centripetal and bidirectional cores. As the data presented here are based on a field survey, a complete technological analysis of the assemblages, while warranted, could not be performed. Further systematic surveying of the southern Negev and Arava together with a chronological attribution of these find spots is needed. This will assist in evaluating the cultural affinities of the groups that passed through this region and their preferred routes to cross the Negev desert into or from Arabia.

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