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Beisamun: An Early Pottery Neolithic Site in the Ḥula Basin

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Introduction

During April–May 2007, a salvage excavation was conducted on the western fringe of the site of Beisamun (map ref. NIG 25403–8/77682–715; OIG 20403–8/27682–715),[1] prior to construction on north–south Road 90, between Rosh Pinna and Qiryat Shemona.

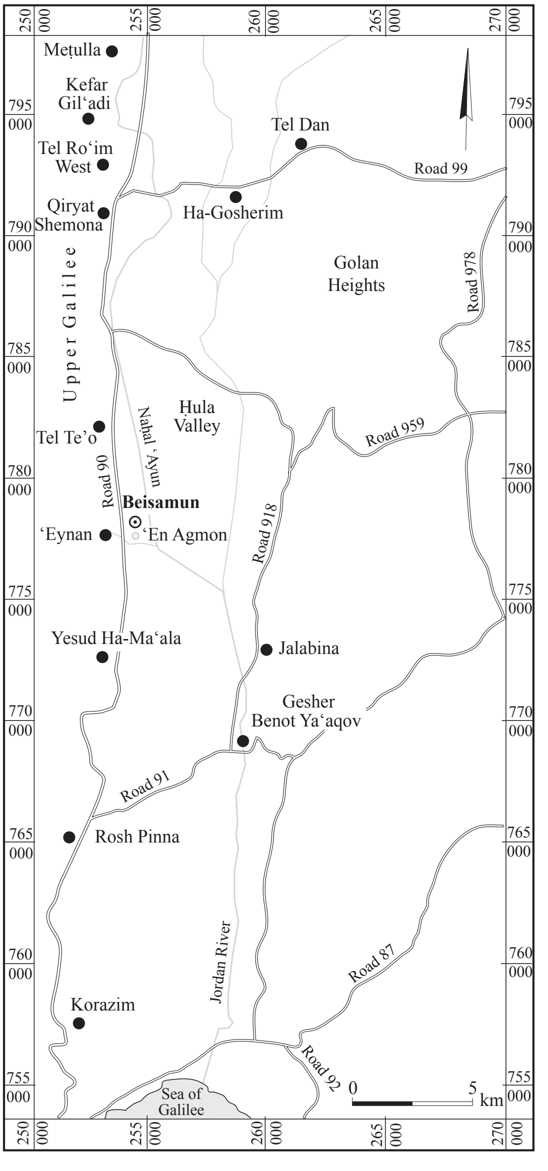


Fig. 1. Location map.

The site is located in the western part of the Ḥula Basin, about 5 km north of Yesud Ha-Ma‘ala and some 2 km west of modern-day Ḥula Lake (Fig. 1). It is situated alongside numerous water sources, including Naḥal ‘Eynan, which conveys water from the ‘Eynan Springs to the Ḥula Valley, and ‘En Agmon, to the south of the site. A broad alluvial plain, formed as a result of the draining of the original Ḥula Lake in the 1950s, extends east of the site. Several prehistoric sites in the vicinity include ‘Eynan (‘Ein Mallaḥa), a major site of the Natufian culture (Perrot 1966; Valla et al. 2007), and Tel Te’o (Eisenberg, Gopher and Greenberg 2001), a multi-stratum site occupied from the Neolithic period to the Early Bronze Age. Beisamun is one of the largest sites in the southern Levant dating to the late phase of the Pre-Pottery Neolithic B (PPNB; Lechevallier and Perrot 1973; Lechevallier 1978), extending over an estimated area of c. 10 hectares. The site of Beisamun comprises three subsites: Tel Mallaḥa, a multi-occupational tell from the Early Bronze Age until the Roman period, the Pre-Pottery Neolithic (PPN) site that extends to the north of Tel Mallaḥa, and the Pottery Neolithic (PN) occupation in Beisamun West, southwest of the tell, situated on a gentle slope that descends to the foot of the Naftali Hills. The present excavations are included within Beisamun West (Fig. 2).

The site of Beisamun was first discovered at the end of the 1950s by members of Kibbutz Manara, when they constructed fish ponds in the area to the north and west of Tel Mallaḥa. The site was initially investigated by Amnon Assaf (curator of the Ma'ayan Barukh Museum of Prehistory), who collected a large assemblage of flint and stone artifacts from the surface. A Bronze Age settlement at the foot of Tel Mallaḥa was documented by Perrot (1966). After Pond 10 was drained in 1965, Perrot discerned at its bottom (some 0.7 m below the surface) walls, residues of plaster floors and pebbled areas associated with a PPNB lithic assemblage (Perrot 1966; Le Brun 1969). In 1969, when the pond was drained again, these structures were mapped by Monique Lechevallier. A sounding excavated by Lechevallier next to the base of one of the northern walls in Pond 10 revealed that only the foundations were preserved, while the plastered floors were gone. In 1972, Pond 2 was drained for cleaning and, amongst other structures, a large, well-preserved PPNB building with a thick plaster floor (L150) and two plastered skulls were discovered (Lechevalier 1978:134–135).

In 1971, seven deep trenches were conducted by Lechevallier to the southwest of the fish ponds and approximately 150 m north of the present excavation (Fig. 2). A few Wadi Rabah pits and small structures were discovered in these trenches, but no PPNB component (Lechevallier 1978:281). Rosenberg et al. (2006) claimed that there are indications of a significant occupation of the Wadi Rabah culture in the area of the trenches.

In 2007, two separate salvage excavations were carried out alongside Road 90 (Fig. 2): the first, by one of the authors (H.K.; Areas A, B, C), discussed here (for a preliminary report, see Khalaily, Barzilay and Yaffe 2009), the second by Rosenberg, of Haifa University (Rosenberg, Getzov and Assaf 2010). Both excavations exposed the remains of an Early Pottery Neolithic occupation. In addition, a long-term excavation project of the PPNB settlement at Beisamun has recently been initiated in the area of the fish ponds—a joint project of the Centre National de la Recherche Scientifique (CNRS) and the IAA. One of the aims of this project is to study, from a diachronic perspective, the dynamics of site occupation, environmental exploitation, and biocultural transmission within the restricted area of the Ḥula Basin (Bocquentin et al. 2007:2).

THE ENVIRONMENTAL SETTING

The Ḥula Basin is a clearly defined corridor (25 km long, 8 km wide, c. 177 sq km), located in the northern Jordan Valley, between the Upper Galilee and the Golan Heights, at an elevation of c. 70 m above sea level. Its southern border is defined by basaltic hills stretching from Korazim to Rosh Pinna, referred to as the basalt 'plug' (Goren-Inbar et al. 2004:726), originating from late Pleistocene volcanic activity. In the north, the Ḥula Basin is delimited by a more gradual transition to the elevated Beqa'a Valley in Lebanon. Lime-rich lacustrine sediments indicate that a fresh water lake existed here, which expanded in size and depth during glacial and interglacial periods. Deep pollen cores taken in the western Ḥula Basin indicate that it was swampland until about 20,000 years ago (Heimann et al. 2009), while the modern-day Ḥula Lake was formed during the last 14,000 years. Prior to its drainage in the 1950s, the Ḥula Lake was a shallow basin (5.3 km long, 4.4 km wide, 12–14 sq km), with an average depth of 2 m. The area north of the lake was covered in peat swamps with dense stands of papyrus (Dimentman, Bromely and Por 1992).

The ample water in the Ḥula Basin attracted human settlement from early prehistoric until recent times. The Lower Paleolithic site of Gesher Benot Ya'aqov is the earliest evidence of human adaptation in this setting (Goren-Inbar and Speth 2004:2), and the Naṭufian site of 'Eynan ('En Mallaḥa) is considered today the

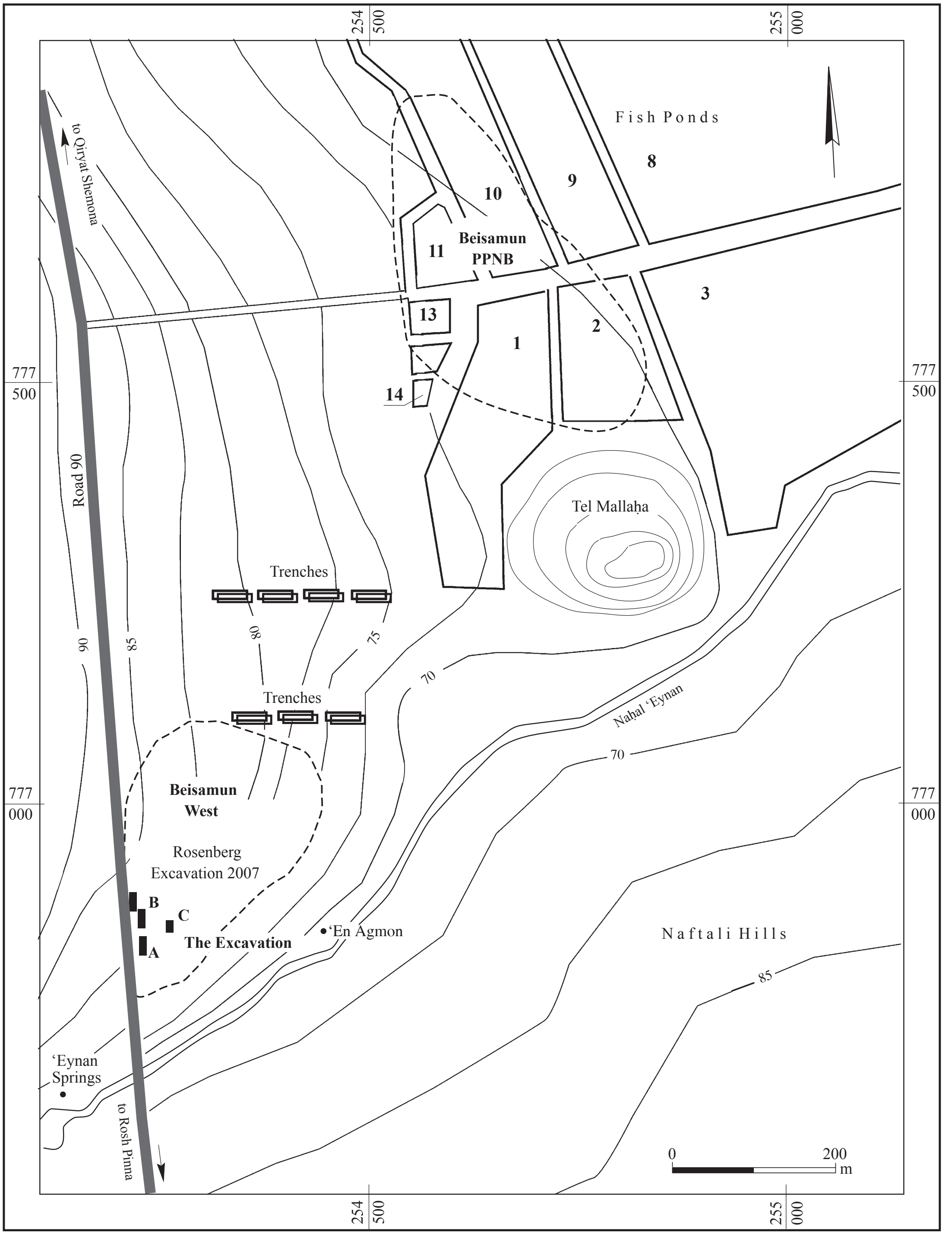


Fig. 2. The site of Beisamun and the location of the excavation areas.

earliest permanent settlement on the western fringe of the Ḥula Basin. The finds from the latter site attest to the excellent conditions enjoyed by the occupants (Bocquentin et al. 2007; Valla et al. 2007). The Pre-Pottery and Pottery Neolithic periods (9000–6000 BCE cal.) in the Ḥula Basin are represented by a long and intensive occupational sequence, revealed at the sites of Kefar Gil‘adi and Jalabina (Kaplan 1966), Tel Ro‘im West (Nadler-Uziel 2007; Nadel and Nadler-Uziel 2011), Ha-Gosherim (Getzov 1999; 2008), Tel Te'o (Eisenberg, Gopher and Greenberg 2001) and Beisamun.

THE EXCAVATION

Following plans to enlarge the section of Road 90 in the vicinity of the site, it was necessary to conduct preliminary soundings to investigate the presence of any archaeological remains. Four test pits were carried out in November 2006 along a narrow strip beside the road that was to be expanded. A layer of archaeological remains was revealed at a depth of 0.4 m below the surface, ranging in thickness between 0.5 m at the western edge and 1.2 m toward the east, overlying the sterile *terra rosa* (heavy clay) soil. The remains consisted of several habitation levels with stone walls and pits. Subsequently, a salvage excavation was conducted to determine the depth and nature of the archaeological horizons, as well as their chronological affiliations. Three areas were opened (Areas A, B, C), c. 10 m apart (Fig. 2).

While the nature of the excavation was salvage, the method utilized consisted of the excavation of units of 10 cm in depth until architecture was revealed; then, the areas were each divided into squares and the sediments were removed in units of 5 cm in thickness. Locus numbers were only assigned to architectural features and structures. All sediments were dry-sieved through a 10 mm mesh.

Five squares were excavated in southernmost Area A, five squares in Area B and one in Area C. Building remains and numerous artifacts dated to the Early PN period were discovered. The nature of the excavations did not allow for the exposure of entire structures. Three stratified layers were discerned in Areas A (Plan 1: Section 1–1) and B, and four layers in Area C (Plan 3: Section 3–3).

Layer I: The upper layer (c. 0.5 m thick) is characterized by dark brown clayey soil that had been disturbed by deep plowing over many years. This horizontal layer contained few archaeological finds.

Layer II: The middle layer (over 0.6 m thick) consists of a gray-brown clayey soil, rich in organic material and ash. Most of the artifacts and architectural remains were retrieved from it. Two superimposed levels make up this layer. The upper level (thickness c. 0.2 m) contained small, mostly burnt, angular limestone gravel and many basalt fragments. This level was exposed throughout all the excavation squares and it sealed the occupation level at the site. Below this was a light-colored, friable clayey soil mixed with small stones (c. 0.4 m thick). All the Pottery Neolithic building remains at the site were exposed in this level. The level tapered toward the west, suggesting that the excavation area is located on the western fringes of the settlement.

Layer III in Area C: In Area C, the first two layers overlaid an archaeological layer not present in Areas A and B (Layer IIIC; see Plan 3: Section 3–3). The fill of Layer IIIC was composed of loose, dark gray clay with a few minute stones and was rich in architectural remains. Based on the flint tools, this layer is dated to the Pre-Pottery Neolithic period.

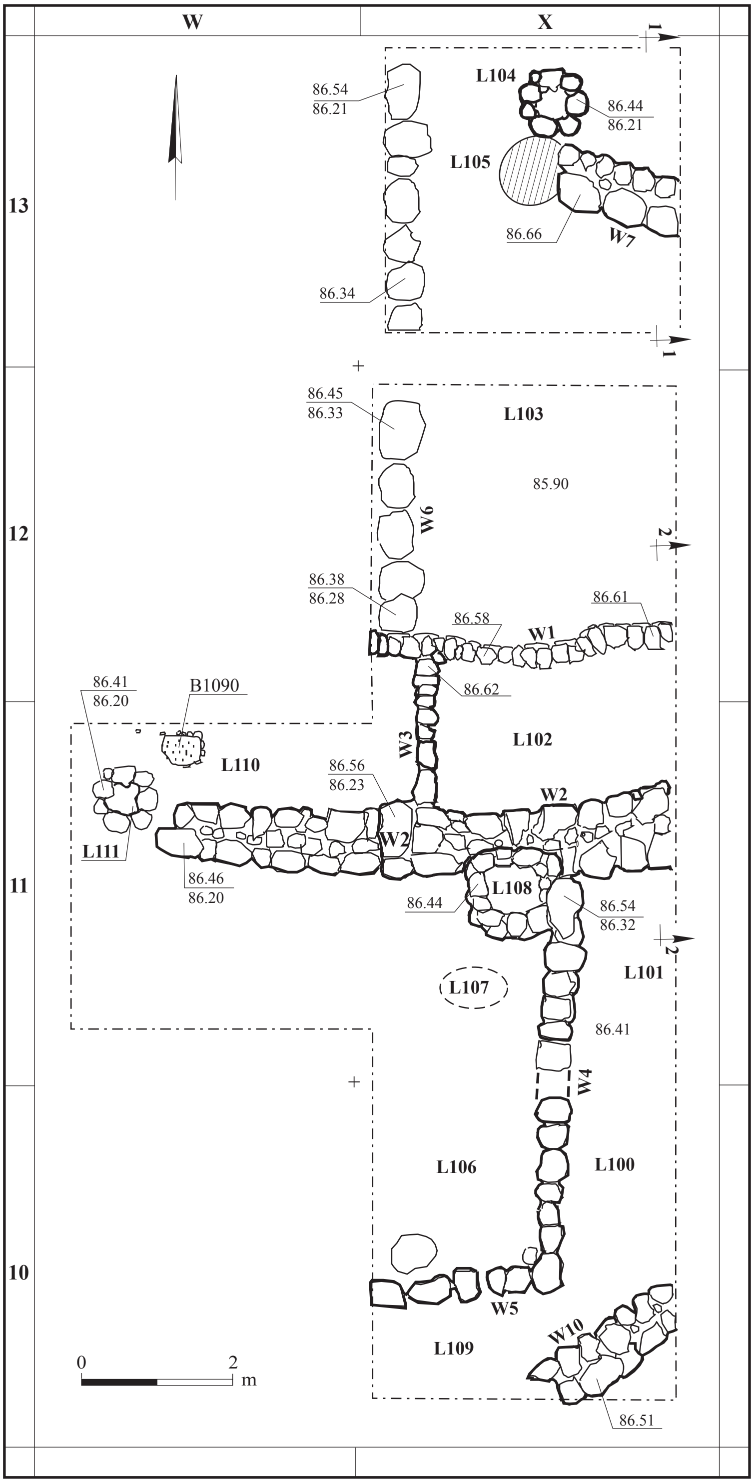
Layer III in Areas A and B, Layer IV in Area C: Underlying the archaeological levels was a layer of reddish brown *terra rosa* soil that lay upon bedrock and contained no stones or archaeological finds (c. 0.7 m thick). Nonetheless, it served as the natural surface of the human occupation in this part of the site, as most of the wall foundations and the various installations rested upon the top of this layer.

Area A (Plan 1)
Five squares were opened in Area A, four in a row from south to north (X10–13), and an additional square (W11) to the west of Sq X11, to verify the extremity of the site. Despite the relatively small exposure, architectural features were dense and well-preserved in this area, testifying to the presence of well-arranged, rectilinear dwellings and courtyards, and a relatively large number of constructed hearths and pits. Often, it was difficult to identify the hearth and pits as their fill was similar to the natural soil around them. The walls of the buildings were built of fieldstones with mud-brick superstructures.

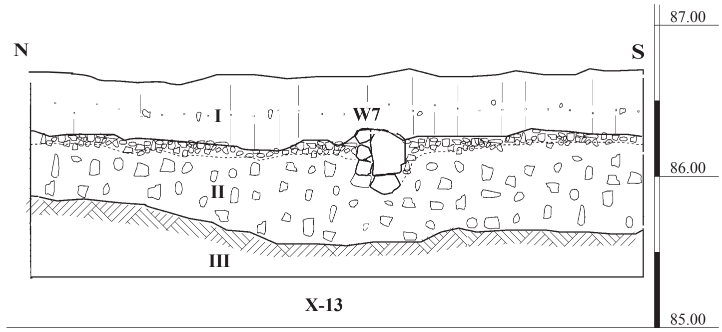
Building 102 (Fig. 3).— This rectangular building, almost completely exposed in Sqs X11–12, was subdivided into two rooms (L102, L110). The wall width is not uniform; W1, preserved to a height of three courses, comprised different-sized fieldstones. The lower courses were constructed of two rows, while the uppermost course was of one row, partly disturbed by agricultural plowing. Wall 2, parallel to W1, was wider, and constructed of fitted fieldstones forming two faces with a fill of small stones between them. This wall was preserved to a height of four courses, approximately 0.6 m high. Both walls, which probably extended further eastward, delimited a long narrow space oriented east–west and subdivided into two rooms by a narrow partition wall (W3). Rooms 102 and 110 have similar dimensions (4 × 2 m), although the northern wall of Room 110, the continuation of W1, is missing. The floors of the two rooms were of beaten earth overlaid by a well-leveled layer of packed stones.

Installation 111.— At the western extremity of W2, a rounded installation was exposed,

Fig. 3. Area A, Room 102, looking east.



Plan 1. Area A, Layer II, plan and sections (on opposite page).



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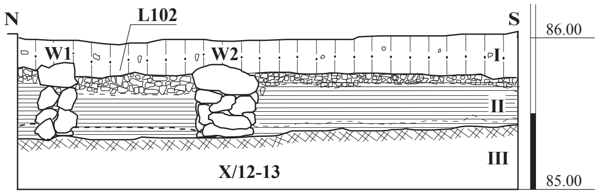

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Fig. 4. Area A, Installation 108, looking east.

c. 0.6 m in diameter. This small installation was built of one row of medium-sized fieldstones surrounding a compacted patch of ashes. A similar patch of compact ash was found approximately 0.3 m to the north (B1090). It seems that Installation 111 functioned as a hearth, although, apart from ashes, there is no further evidence such as heated flints or burnt bones.

Installation 108 (Fig. 4).— Against the southern face of W2, a round installation was uncovered (diam. c. 1 m). It was constructed of one row of large fieldstones overlaid by an additional row of medium-sized stones that had partly collapsed into it. The fill was of loose ash with a small patch of compacted ash in the lower portion. Numerous burnt bones were concentrated among the loose ash and over the compacted ash. This installation was apparently a hearth, although no signs of burning were detected on the stones.

Room 106.— This space (5.2 × 5.8 m) appears to belong to Building 101 that continues to the east beyond the excavation area. Its eastern wall (W4), aligned north–south, abutted W2 of Building 102 and extended southward into Sq X10. It seems that W4 and W5 enclosed the eastern and southern sides of Room 106. The southwestern portion of the room was not exposed, but W5 could be seen in the western balk of Sq X10. The room was entered through a 0.6 m wide entrance in W4. A thin layer of packed earth and small angular stones served as the floor, and the fill over it contained flint artifacts, pottery sherds and stone vessels. A shallow pit (L107) containing small burnt stones was discerned near the northeastern corner, adjacent to Installation 108.

Another wall (W10), built of two rows of stones, was exposed in the southeastern corner of Sq X10, indicating the existence of an additional structure to the south.

The area to the north of Building 102 contained a few isolated architectural features, including walls and an installation. These remains had suffered both ancient and modern disturbances, such as a water-pipe channel that crosses Sq X12 from east to west.

Wall 6.— A massive wall, built of one row of large fieldstones, traverses Sqs X12–13 for a preserved length of 10 m. This wall is perpendicular to W1 and was clearly constructed in a later phase. The size of the stones and the way they were set indicate that this wall did not serve a domestic purpose, but was rather a defensive wall. It probably delimited an open courtyard or open area between two complexes (L103). No associated features or evidence of human activity, such as a floor, were discerned, and finds were scarce.

Wall 7.— At the northern end of the excavation area, near the eastern balk of Sq X13, a portion of a thick, east–west wall was partially preserved (0.7 × 1.8 m) up to three courses high (Plan 1: Section 1–1). It was built of two rows of stones, the southern face comprising large dressed stones, the northern face built of small fieldstones. This wall was disturbed in the middle of the square by later Installation 104 and Burial 105.

Installation 104 (Fig. 5).— A rounded installation (diam. 0.75 m), constructed of a single row of medium-sized fieldstones, was discovered to the north of W7. It was filled with sterile soil.

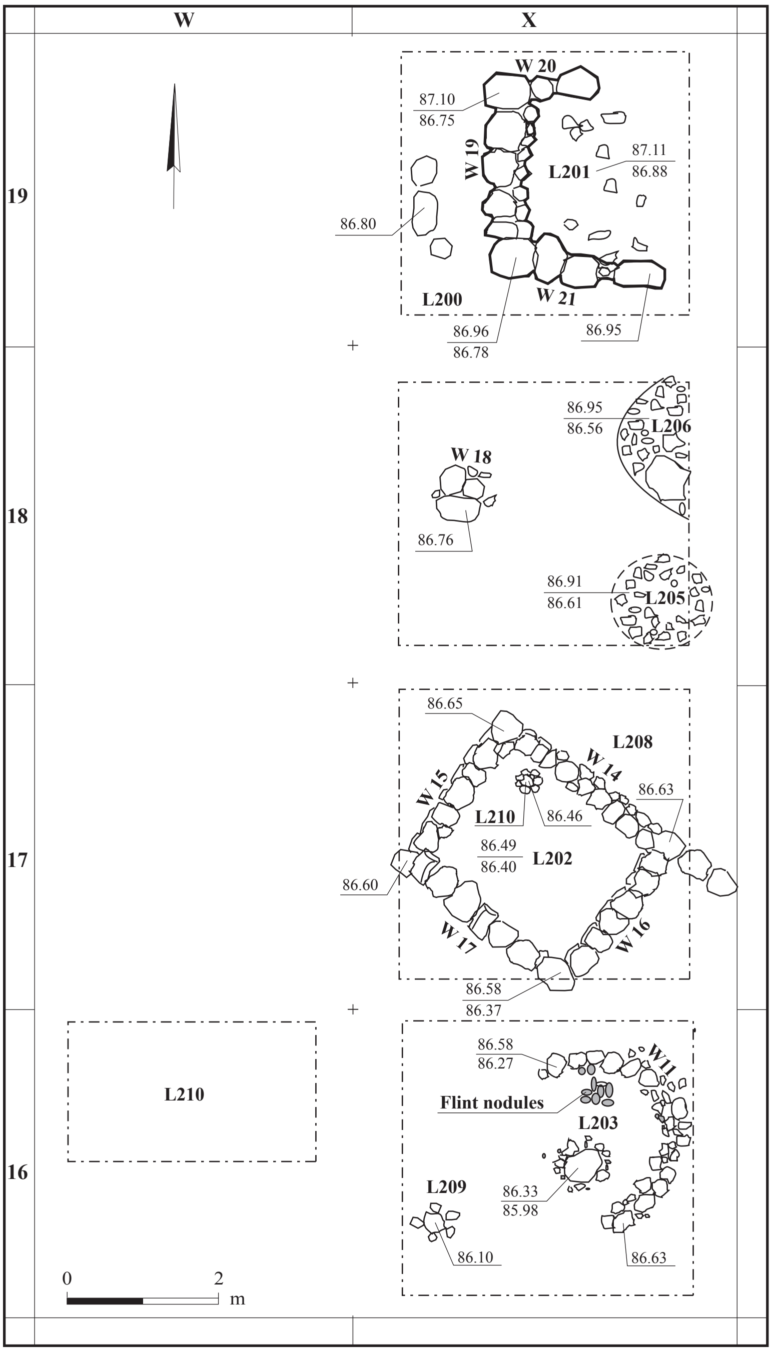
Burial 105.— Below the western end of W7, a patch of packed, dark gray earth (diam. c. 0.6 m) was observed. In this patch were recovered the remains of a poorly preserved human skull, fragments of long bones and a large number of teeth and jaw fragments. As the bones were not in articulation, they probably belonged to a secondary burial. Most of the bones displayed signs of being burnt, indicating cremation.

Fig. 5. Area A, Installation 104, looking south.

Burial offerings placed near the skull include a fine stone bowl (Fig. 28:1) and a few beads made of shells from the Mediterranean Sea. Cremation burials with offerings are rare during the Early PN (Kuperman 2010:194).

Area B (Plan 2)

Area B is located to the north of Area A (Fig. 2). It also comprises five squares, four in a row (Sqs X16–19) and a partial square to the west of Sq X16 (Sq W16). Architectural remains



Plan 2. Area B, Layer II.

Fig. 6. Area B, Room 202, looking north.

were uncovered in Sqs X16–19, some of them disturbed by modern activity, especially cultivation. The buildings and features show the same construction methods and state of preservation as those exposed in Area A, and the same cultural material, indicating that the settlement continued to the north. The architectural features are described from south to north.

Square X16.— Building 203 had apparently been disturbed by deep plowing and only the northern and eastern sides were preserved, comprising a semicircular wall (W11) with a wide opening toward the west. The inner space was densely paved with small angular stones and in the center was a large flat stone surrounded by small- and medium-sized stones, probably a work station. A shallow depression near the northern wall contained a group of eleven flint nodules surrounded by a high concentration of debitage and a few tools. The debitage is of particular interest, as it includes numerous very thin flakes characteristic of axe preparation. Three axes were among the debitage, two in the initial stages of shaping and the third complete (Fig. 15:1). In addition, a shallow depression (L209) to the west of the work station also contained a large quantity of debitage, mainly waste of bifacial preparation. It appears that Building 203 was a knapping spot for producing bifacial tools.

Square X17 (Fig. 6).— A rectangular room (L202; 4 × 5 m) was uncovered in almost the entire square. Two of its walls (W14, W15) were built of two courses of medium-sized fieldstones and preserved to a height of 0.3 m, while the other two walls (W16, W17) were constructed of two courses of large dressed stones preserved to a height of 0.5 m. Two large stones continued eastward from W14, indicating the existence of an additional room or building nearby. Apparently, the entrance to this room was in the western portion of W16, where two flat stones protrude inward from the row of stones. The anthropogenic fill in the inner space contained various-sized stones that had collapsed from the upper courses of the walls, overlying a well-defined floor paved with small, tightly packed stones. A circle of small burnt stones (L210; diam. c. 0.3 m), probably the remains of a hearth, was exposed in the northern corner of the room, next to W14. Two small postholes were preserved in the northern and western corners, and it is reasonable to assume that originally, there was a post in each corner to support a roof.

The finds in the room included numerous flint tools, grinding stones and animal bones—the remains of everyday activities. Noteworthy among the flint tools were several axes in various stages of knapping (e.g., Fig. 14:1). A few had obviously been discarded after knapping mistakes, and others were distally broken, probably after intensive use.

Square X18.— In the eastern part of the square, two pits were partially revealed. Pit 205 was circular (0.7 m in depth), while Pit 206 was elliptical and shallower. The fill in both pits comprised a loose, dark brown sediment, rich in organic materials, pottery sherds, animal bones and flints. Both were apparently refuse pits, and they were sealed with a compact layer of small stones. Although large fieldstones were scattered throughout the square, no architectural remains were identified apart from a pile of stones in the western part of the square (W18), perhaps an indication of a feature here. The absence of architecture suggests that this area served as an open courtyard.

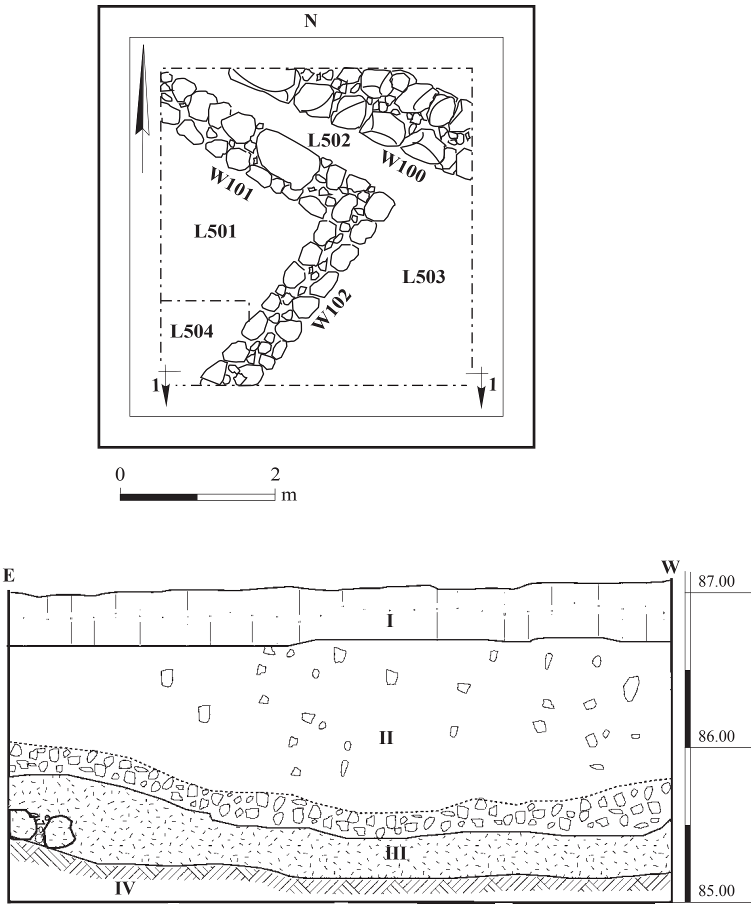
Square X19.— In the northernmost square, the remnants of a rectilinear structure were exposed. Building 201 was built of a combination of various-sized fieldstones—the first course of small- and medium-sized stones, the upper course of large, dressed stones. The western wall (W19) was well-preserved (4.2 m long), while the northern and southern walls were poorly preserved (W20—0.8 m in length; W21—1.8 m in length). The thick fill between the walls (0.36 m deep) lay upon a brown, compacted clay floor (c. 6 cm thick), well-preserved near W19, but disappearing in the eastern portion. The floor was founded upon a gravelly deposit (0.3 m thick), which could have been an intentional fill to level the surface before building the structure.

The material-culture remains in this gravel deposit contained a concentration of many flint artifacts, large mammal bones and a few pottery body sherds. The different construction technique, as well as the high concentration of material finds in such a small area, may indicate that this structure was in use over a longer time than the others, and frequent maintenance was required.

Area C (Plan 3)

In order to examine the stratigraphy further east, presumably toward the center of the site, it was decided to open a test square about 40 m east of Areas A and B. The test square reached a depth of 2 m down to virgin soil, revealing that the Early PN layer (Layer II) was over 1.5 m thick in places, and overlies an additional layer (Layer IIIC) dated to the Pre-Pottery Neolithic (PPN) period (Plan 3: Section 1–1). Although no architectural remains were discerned in Layer II, a thick gravelly level at the base of the layer may have functioned as a living surface, as attested by the density of flint artifacts and bones in it.

Layer IIIC had a different composition and material culture than Layer II. It comprised a loose, dark gray matrix containing a few small stones, and was rich in architectural remains. Within the square, part of a rectilinear structure (L501) was exposed, while an additional thick wall (W100) probably belonged to another structure that remained mostly outside the excavation area. Structure 501 had massive stone walls preserved to a height of 0.3 m. Several lumps of orange clay suggest that mud bricks were probably involved in the construction. Walls 101 and 102, both preserved to a length of 3 m, were constructed of two rows of large fieldstones with small stones between them. The floor (L501), preserved in the southwestern corner of this massive building, was c. 0.2 m thick and was composed of a compact, dark red soil overlying a level of small, densely packed stones. The finds consisted mainly of



Plan 3. Area C, plan and section.

flint and a few animal bones. Bipolar blades and blade cores were the main products of the flint industry. The tools also show the same tendency, and most of them were shaped on bipolar blade blanks. A detailed report on the flint assemblage will be published elsewhere.

THE LITHIC FINDS FROM LAYERS I AND II

The flint artifacts discussed here were recovered from Layers I and II of Areas A, B and C. The assemblage from these three areas is homogenous, representing the Early Pottery Neolithic period. As mentioned above, the sediments were dry-sieved though a 10 mm mesh. The flint assemblage from Layer IIIC of Area C, which is dated to the Pre-Pottery Neolithic period, will be published elsewhere (for preliminary results, see Bocquentin et al. 2011).

The 6869 flint artifacts were classified into four major categories: debitage, debris, cores and tools (Table 1).

Raw Materials

The immediate vicinity of the site offers various flint sources, mainly from the Eocene formation in the Naftali Hills (Flexer 1961). Most of the flint originates from these sources, and is chalky and coarse, of medium quality, ranging in color from white to whitish brown. Gray and

Table 1. Flint Breakdown

Type	N	%
Flakes	2276	64.0
Blades and bladelets	488	13.7
Primary elements	383	10.8
Core tablets	34	1.0
CTEs	57	1.6
Ridge blades	52	1.5
Overshots	31	0.9
Burin spalls	210	5.9
Bifacial waste	23	0.6
Total Debitage	*3554*	*100.0*
Chunks	674	44.4
Chips	844	55.6
Total Debris	*1518*	*100.0*
Debitage	3554	51.7
Debris	1518	22.1
Cores	70	1.0
Tools	1727	25.1
Total	*6869*	*100.0*

dark brown flint occurs in small quantities. Ad-hoc tools were fashioned on-site from this local white to gray flint. In contrast, the majority of the formal tools, especially sickle blades and arrowheads, were knapped of a high-quality flint originating from outcrops far from the site. They were probably manufactured off-site and then brought to the site, as attested by the lack of similar material among the debitage.

Debitage

Flakes constitute the most prominent category of debitage in the assemblage (64%; see Table 1), followed by blades and bladelets that are represented almost equally, in relatively low numbers (7.5% and 6.2% respectively). Primary elements comprise 10.8% of the total debitage. It is evident from these frequencies that the flint industry at the site was flake-oriented. Two main reduction sequences can be reconstructed, one primary, the other secondary. The main reduction sequence produced flakes from single-platform and amorphous cores, while the secondary sequence produced blades from small, single-platform cores, some of them even prismatic. These cores were exploited intensively and some of them were reused for the production of bladelets, although a few of the cores were designated specifically for bladelet production. The presence of large, thin flakes, mainly of whitish flint, together with smaller amounts of bifacial spalls, suggest the presence of an additional reduction sequence for bifacial tools, which was performed in the excavated areas of the site. This sequence is further evidenced by the number of bifacial tools in initial stages of production, and others that had undergone maintenance and reshaping.

The assemblage includes 174 items classified as core-waste items, including core tablets and core-trimming elements (2.6% of the debitage), ridge blades (1.5%) and overshots (0.9%).

The ratio of core to core waste is over 1:2, a relatively low number of 2–3 items per core. This may be explained by the lack of elaborate core preparation and the utilization of simple flake cores. The medium quality of the raw material used mainly for ad-hoc tools did not permit core rejuvenations; therefore, the knappers preferred to discard the cores when complicated removal of core tablets was required. A secondary reason for the low frequency of core-waste items stems from the limited exposure, and such items may have been concentrated outside of the excavated areas, as the distribution of the waste material points to particular knapping localities at the site (e.g., L202, L203, L209 in Area B). In addition, it is possible that the knappers did not shape the cores by conventional methods, such as preparation of striking platforms and ridges, as known in Palaeolithic and Pre-Pottery Neolithic flint industries (Garfinkel and Dag 2001).

Core tablets and core-trimming elements (Fig. 7:1–3) appeared in a variety of forms, all characterized by the presence of negative removals. Of the 52 ridge blades, 22 are primary ridge blades (Fig. 7:4), 14 are ridge

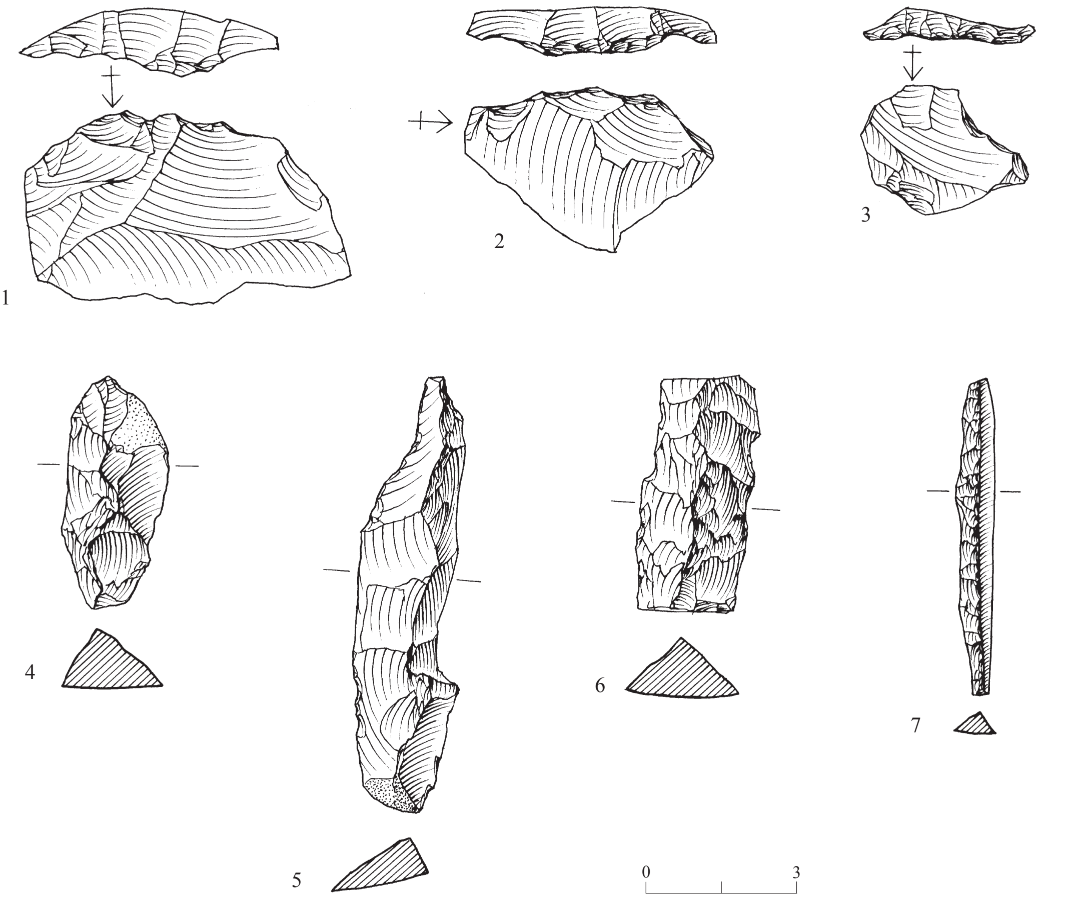


Fig. 7. Core tablets and core-trimming elements (1–3), primary ridge blade (4), ridge blades (5, 6), secondary ridge blade (7).

blades (Fig. 7:5, 6), and the remaining 16 are secondary ridge blades (Fig. 7:7). The latter items have an average width of 1.2 cm and a thickness of 0.92 cm, and usually display blade scars perpendicular to the axis of the blade on one side, and remains of central flaking scars on the other.

The 31 overshots are an additional core waste indicating that the debitage surfaces of the cores were often renewed. The knappers usually overcame hinges in the debitage surface by removing a major portion, resulting in an elongated flake or blade that retains part of the core base. Most overshots (90.3%) were removed from single-striking platforms, and only four examples show signs of being removed from cores with two opposed striking platforms on their distal and proximal ends. One overshot item was burnt and another had undergone desilication.

According to the frequency of the core-waste elements, it can be concluded that knapping activities at the site were flexible, often shifting from flake to blade production in the same core. This represents an opportunistic knapping technique, evidenced mainly when raw material is readily available and flakes are the main artifacts produced, as in many Pottery Neolithic assemblages in the southern Levant (Matskevich 2005:61).

Debris

This category comprises 1518 artifacts, 22.1% of the total assemblage, made up of 844 chips

Table 2. Core Types by Debitage Plane

	Flakes		Blades		Bladelets		Flakes/Blades		Total	
Type	N	%	N	%	N	%	N	%	N	%
1	8	17.0	4	57.1	6	46.2	2	66.7	20	28.6
2	6	12.8	3	42.9	4	30.8			13	18.6
3	7	14.9			3	23.1	1	33.3	11	15.7
4	21	44.7							21	30.0
5	5	10.6							5	7.1
Total	*47*	*100.0*	*7*	*100.0*	*13*	*100.0*	*3*	*100.0*	*70*	*100.0*

(c. 56%), and the remainder, chunks. The relatively small quantity of chips is probably due to the fact that sieving was carried out in a 10 mm mesh.

Most of the chunks were roughly flaked (less than three scars), on tabular, yellowish white flint, and vary in size and shape. In many cases they display square sections, and cortex covers much of the surface. Many of the larger pieces were naturally broken, probably having rolled down from the upper slope. The double patina observed on some of the broken surfaces reinforces the assumption that they were naturally broken.

Cores

A total of 70 cores were recovered (see Table 1): 65 from Layer II and 5 from Layer I. Most are small to medium-sized, 1.2–7.6 cm in length, and only five examples measure up to 12 cm in length (see below). The cores were classified into five types based on their debitage plane (Table 2):

Type 1: Single Striking-Platform Cores (Fig. 8:1, 2).— This type comprises 20 cores (28.6% of the total cores): 8 flake cores, 4 blade cores, 6 bladelet cores and 2 are a combination of flake and blade cores. About half of the cores of this type bear cortex over 25–50% of their surface. This type can be further divided into two subtypes based on size: five cores were shaped on large pebbles, 7.6–12.0 cm long, of whitish brown flint, the remainder are small, 1–5 cm in size and shaped mostly on gray or dark brown flints. No cores of high-quality raw material were detected. Some 40% of these cores have a facetted striking platform, while the rest are flat. They are often elongated, either prismatic or pyramidal in shape, with a few rounded examples.

Two cores reveal signs of pecking that were partially removed, indicating that these pebbles were originally hammerstones, then re-used as cores.

Type 2: Double Striking-Platform Cores (Fig. 8:3, 4).— There are 13 cores of this type (18.6% of the total): 6 flake cores, 3 blade cores, and 4 bladelet cores; all are made of local raw materials. Eleven cores have opposed platforms, and two have two platforms at a 90° angle.

This core type is relatively homogeneous in size, 2–8 cm long. Half of them have a flat striking platform, the remainder exhibit signs of preparation on the striking platform edges. One core shows signs of pecking, mostly removed during preparation of the striking platforms.

Within this type are two bi-directional, or naviform cores (Fig. 8:4), which are characteristic of Middle PPNB assemblages and uncommon in Pottery Neolithic assemblages (Khalaily 2006:329), although Matskevich (2005:29) claims that such cores do appear in Yarmukian assemblages. In any case, these two cores had apparently undergone a mineral deformation, such as decalcification; therefore,

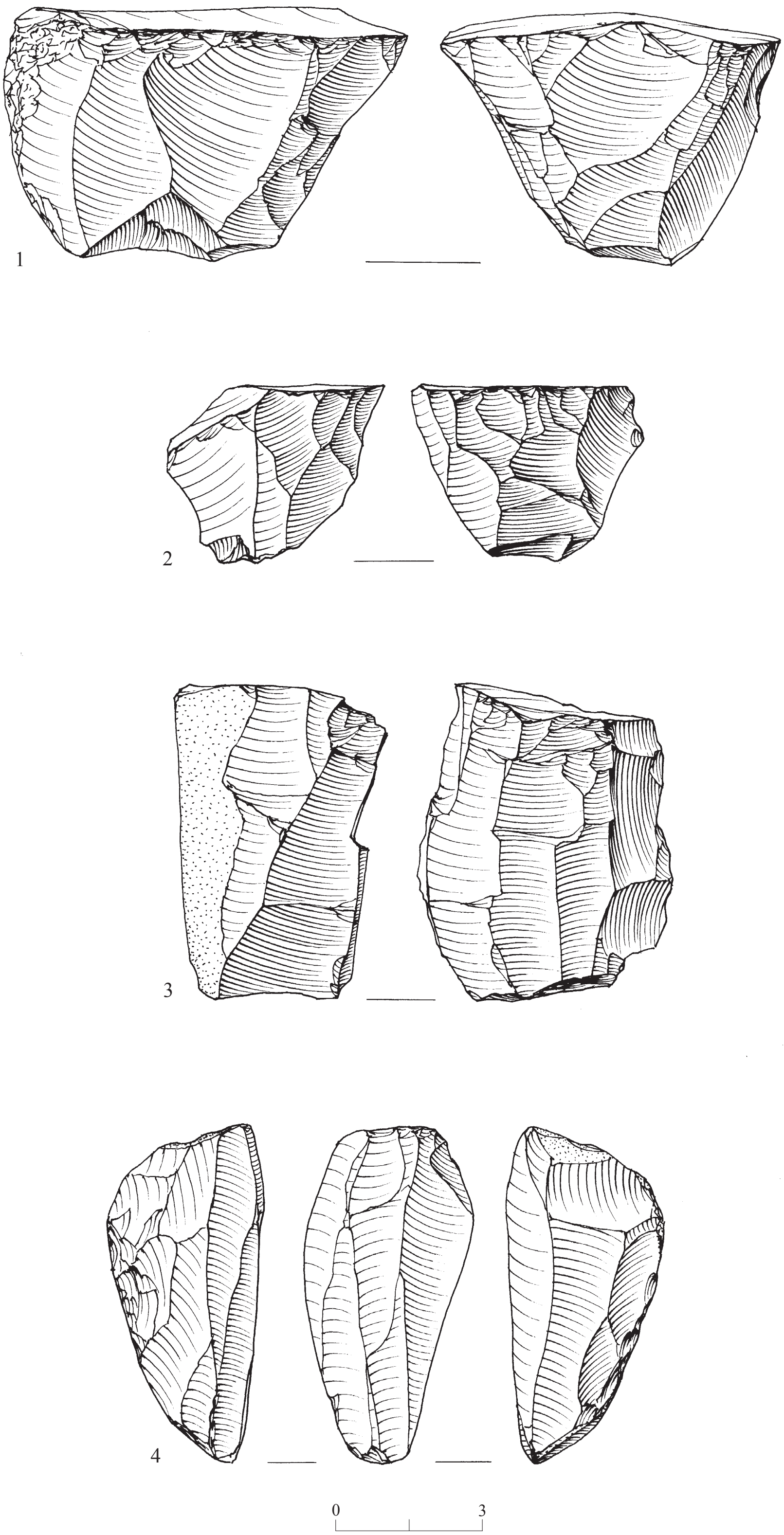


Fig. 8. Flint cores: single-platform cores (1, 2), double striking-platform cores (3, 4).

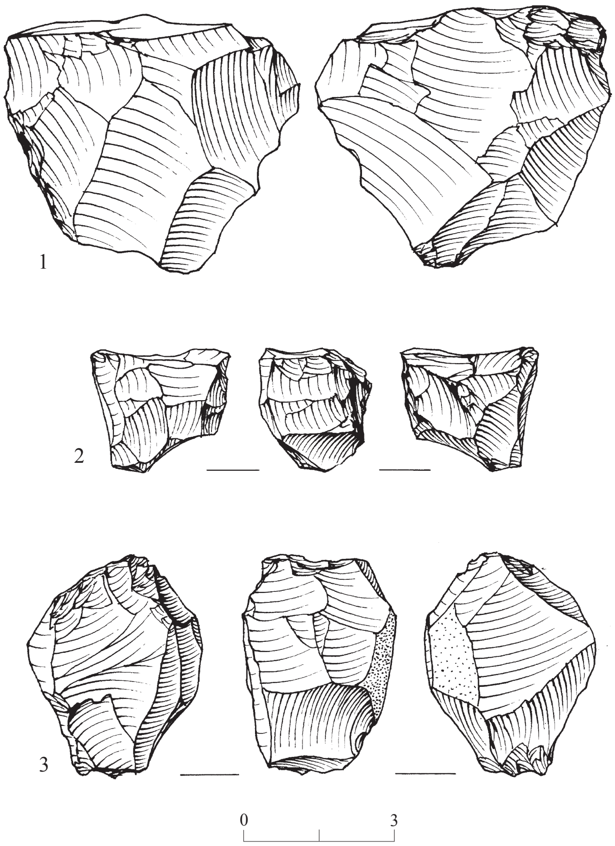


Fig. 9. Flint cores: more than two striking platforms (1, 2), amorphous core (3).

they are probably intrusive and originated in the nearby PPNB site.

Type 3: Cores with More than Two Striking Platforms (Fig. 9:1, 2).— This type comprises eleven items (15.7%), seven of which are flake cores, three, bladelet cores and one, a flake/blade core; the vast majority were shaped on gray or dark brown flint. Eight have opposed platforms on the same side and one on the other, while the rest have three platforms in various locations. Cores of this type show a high degree of exploitation, as attested by the frequency of cortex—10–20% of the total surface.

Type 4: Amorphous Cores (Fig. 9:3).— Amorphous cores are the largest group in the core assemblage, comprising 21 items. This type includes all cores whose condition hinders the determination of clear striking platforms or knapping directions. They are generally small and rounded in shape, exhausted and designated mostly for flake production.

Type 5: Flake Cores.— Five cores were fashioned on thick flakes (c. 7% of the cores), all probably used for knapping flakes. Two were made of dark flint, and the rest are large flakes that were detached from whitish flint and used for bifacial preparation. Due to their shape, less than 10% of their surfaces are covered with cortex.

Tools

The tools in this assemblage (n = 1727) comprise 25.1% of the total flint assemblage. The majority of the tools (76.5%) are ad-hoc (Table 3). The formal groups, arrowheads,

Table 3. Frequencies of Flint Tools

Type	N	%
Arrowheads	51	3.0
Sickle blades	274	15.9
Bifacial tools	84	4.9
Pressure-flaked knives	42	2.4
Scrapers	79	4.6
Burins	141	8.2
Perforators	74	4.3
Notches and denticulates	302	17.5
Ret. blades/bladelets	316	18.3
Ret. flakes	272	15.7
Truncations	50	2.9
Multiple	42	2.4
Total	*1727*	*100.0*

sickle blades and bifacials, are present in considerable quantities, partially due to the methods of retrieval. The typological analysis of the tools is mainly based on the type lists compiled by Gopher for the Neolithic assemblages from Munḥata (Gopher 1989) and Naḥal Zehora (Barkai and Gopher 2012:783), with some modifications after Khalaily (2006).

Arrowheads

Layers I and II yielded 51 projectile points constituting 3% of the tools. While many of them are fragmentary, this did not hamper our ability to recognize the types to which they belong. Only six specimens could not be assigned to any of the familiar types and were grouped under Type A-11. The arrowheads are classified below according to the typological lists collated by Gopher (1989:29) and Burian and Friedman (1979).

Amuq Points Type A-6 (Fig. 10:1–3, 8).— The Amuq point is a leaf-shaped arrow with a pointed base that has no barbs, and is either triangular or trapezoidal in section. Pressure flaking covers part or all of the point. In this assemblage, 51% of the arrowheads belong to this type (n = 29), of which only two are complete. Nine of them were fashioned on local dark gray, nodular flint, containing white inclusions that could be fossils, two are on beige, one on light brown and one on pinkish flint. The remaining 16 were shaped on high-quality, dark brown flint. Thus, it is evident that the Amuq points were shaped off-site from high-quality raw materials. Three arrowheads exhibit thick white patina, and seven bear signs of burning.

Two subtypes of Amuq points were discerned: (1) leaf-shaped points (n = 24), with pressure flaking located mainly on the tangs and on a limited part of the body (Fig. 10:1, 2); (2) narrow, elongated, leaf-shaped points (n = 5) fashioned by full pressure flaking (Fig. 10:3). Gopher (1989:92) describes the pressure flaking that shaped the tangs of Subtype 1 as a wavy denticulation on both edges of the lower part. The tips, however, are pointed with semi-abrupt retouch on the ventral surface. Two Amuq arrowheads have broken tips and were reused as burins. One complete (Fig. 10:1) and one broken arrowhead (Fig. 10:8) have bifacial denticulation along the lateral edges, the denticulations are deep and fashioned by pressure retouch. Five additional tangs and three tips also belong to Subtype 1.

Byblos Points Type A-5 (Fig. 10:4–7).— Arrowheads of this type are leaf shaped, with wide, rounded shoulders and a prominent tang. Some of the bodies have limited pressure retouch on the ventral surfaces (e.g., Fig. 10:4), while on others the pressure retouch is located on both edges of the dorsal surfaces. These arrowheads were shaped on two different types of blanks: thin, wide blades with a triangular cross section, or thick blades with a trapezoidal cross section.

The twelve Byblos points include two complete items, as well as seven body fragments and three tang fragments. The local white and gray flints were the main raw materials used for the preparation of these arrowheads. The average length of the two complete arrowheads is 7 cm, with a prominent tang that comprises

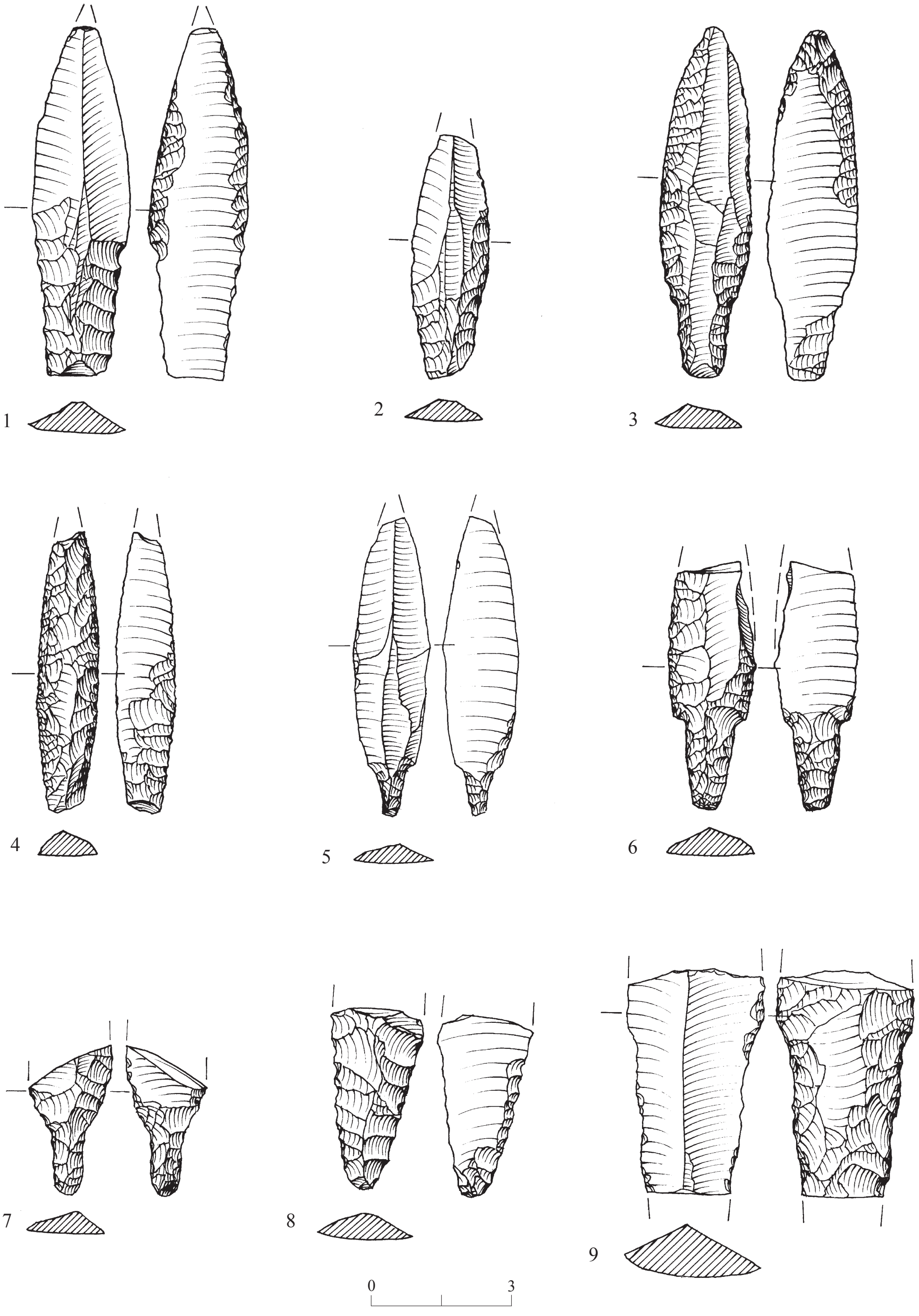


Fig. 10. Arrowheads: Amuq arrowheads (1–3, 8), Byblos arrowheads (4–7), dagger (9).

about half the length of the body. The tang joins the shoulder at an angle of over 90°, as is compatible with the general definition of this type of arrowhead (Gopher 1994:36). Three shapes of tangs were discerned. The first has a trapezoidal cross section, and is characterized by a central flat scar on the dorsal side and semi-abrupt retouch on both lateral edges. The retouch direction is usually from the ventral to the dorsal side. The second shape has a triangular cross section and was shaped by convergent pressure retouch toward the central dorsal axis. The third tang shape is similar to the second, but shorter and narrower, and the pressure retouch is less symmetrical (e.g., Fig. 10:7).

Daggers Type A-12 (Fig. 10:9).— Daggers are very rare in Neolithic assemblages. They have the same characteristics as arrowheads, but are larger in dimension. The four examples in this assemblage were made on wide (5 cm), thick blanks (up to 3 cm), and shaped by pressure retouch. All four were broken, comprising two proximal and two distal ends (Fig. 10:9). Two items exhibit full pressure retouch on their ventral sides, the other two have intensive pressure retouch on both sides.

Fragments Type A-11.— This type includes six arrowhead fragments that are not affiliated with any of the types mentioned above. They are made of similar raw material to that of the other arrowheads. Four were obviously burnt and display luster on their surfaces, the remaining two were shaped of gray flint with whitish spots. Three bear partial pressure flaking on their dorsal side, similar to the retouch on the Amuq tangs, and two have pressure retouch on their ventral surfaces.

The typological analysis indicates the dominance of two large arrowhead types, the Amuq and Byblos points, and the absence of small arrowheads, such as the Ha-Parsa, Herẓliyya and Niẓẓanim points (e.g., Garfinkel et al. 2002). The lack of small points is probably related to regionality. Other Early PN assemblages in the area of the Ḥula Basin also lack small points, such as Tel Te'o Strata XII–XI (Gopher and Rosen 2001:55–56) and Tel Ro'im West Stratum IV (Nadler-Uziel 2007:80).

Sickle Blades

In Layers I and II, 274 sickle blades were recovered (15.9% of the tool assemblage), one of the most frequent tools. Sickle gloss is the main criterion for differentiating between retouched blades and sickle blades, although some scholars do not accept this as a necessary condition (e.g., Gilead, Hershman and Marder 1995:255). It should be noted that over 90% of the items were fragmentary, preventing establishment of the original length or width of the blanks, and thus the 10% complete examples can not be considered representative. The sickle blades are classified below according to the typological list of Gopher (1989:95–96).

Type A (Figs. 11:1–6; 12:1–7).— This type of sickle blade is the most common in the Beisamun assemblage (n = 192), representing 70% of this tool category. Most were fashioned on local, light gray flint (21.6%), or dark gray flint with white spots (29.4%), while the raw material of the others can not be identified due to their state of preservation—some are covered by a whitish patina (33%) and the rest (13.7%) show signs of burning. Type A sickle blades are defined as shaped on a rectangular blade blank and have one working edge with the opposite side often plain without retouch, or two working edges, and most are truncated, some at both ends. The working edges display coarse, irregular denticulation shaped by intensive bifacial pressure retouch (Gopher 1989:95). Most of the sickle blades in this assemblage were shaped on relatively long, narrow blanks. Only 23 examples are complete (12%), the working edges of the remainder are missing the proximal (n = 41; 21%), distal (n = 34; 18%) or both ends (n = 94; 49%). In any case, 64 items (33%) are easily identified. Heavy sickle gloss is visible along the working edges, evidence of long-term use. Type A is characteristic of

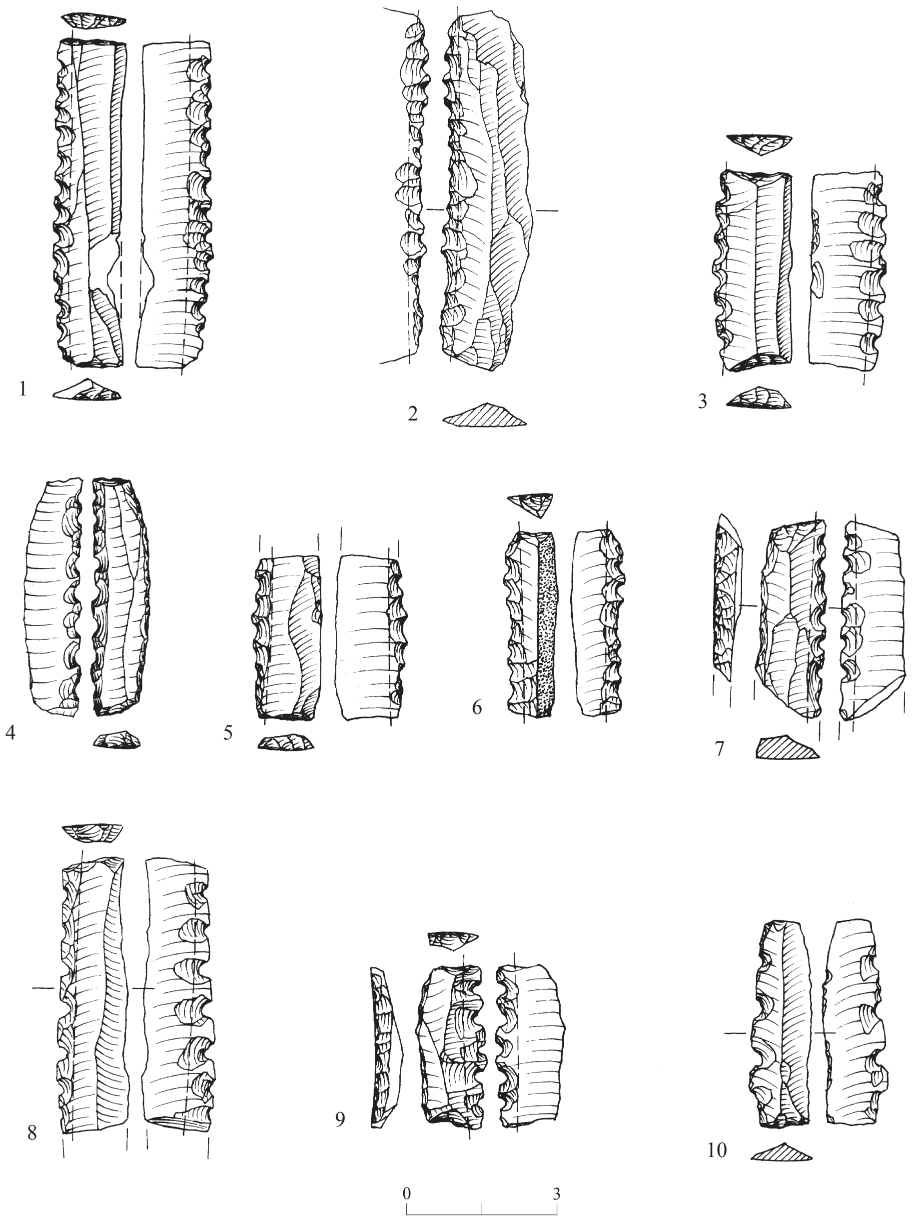


Fig. 11. Sickle blades: deep denticulation on one side (Type A:1–6; Type B:7–10).

Yarmukian assemblages (Gopher 1989:95; Khalaily 2006:306; Garfinkel and Miller 2002).

Type B (Fig. 11:7–10).— This type, represented by only 19 artifacts (7%), is distinct in shape and size from Type A. It is defined as having deep, wide denticulation on the working edges shaped by bifacial retouch, and pressure retouch is noticed on all artifacts (Gopher, Barkai and Assaf 2001; Garfinkel and Matskevich 2002). The opposite side, in most cases, is plain, and only one example (Fig. 11:9) was backed by semi-abrupt retouch. Most distal and proximal ends were truncated by semi-abrupt to abrupt

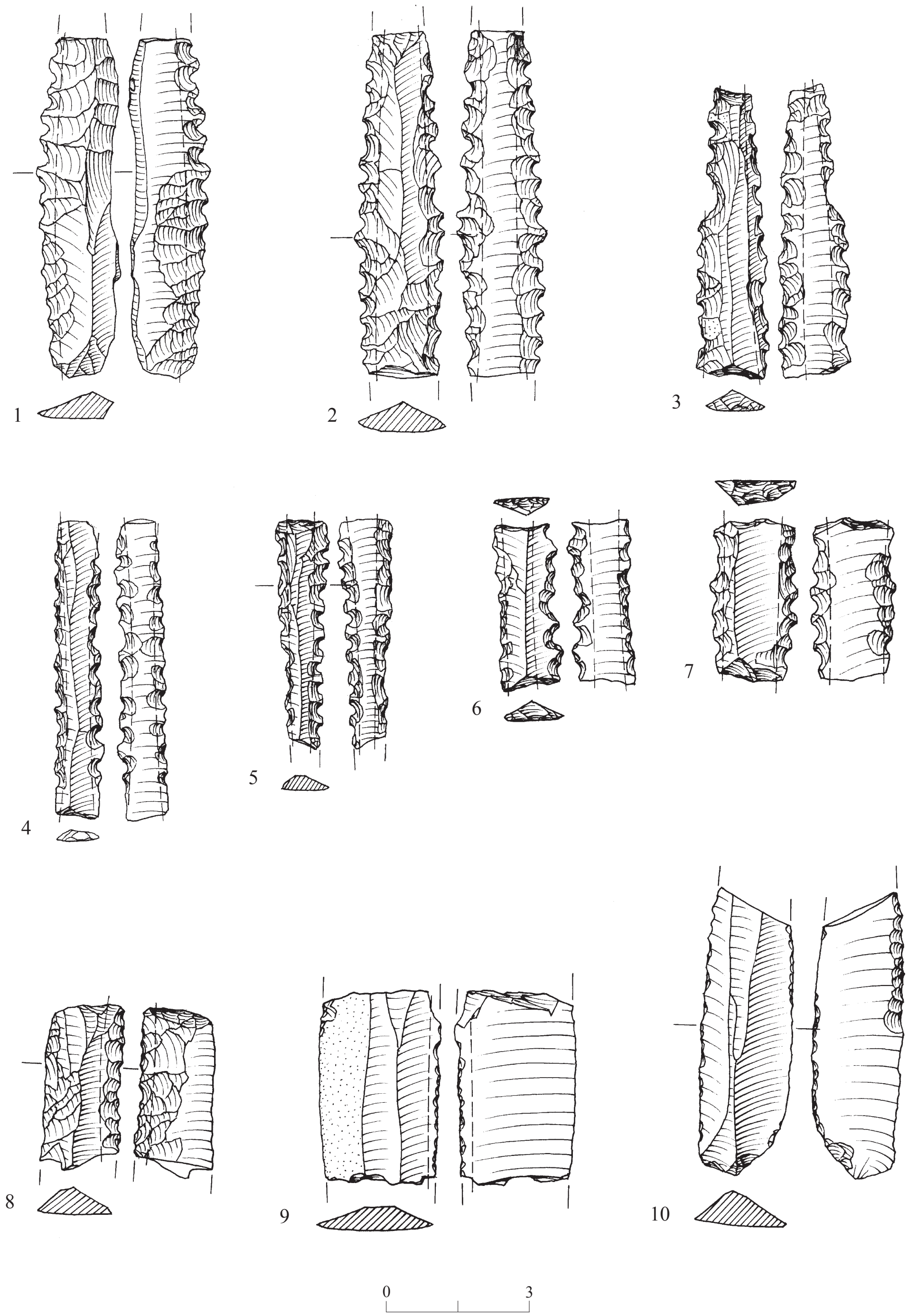


Fig. 12. Sickle blades: deep denticulation on two sides, Type A (1–7), wide sickle blade with pressure retouch, Type C (8), plain sickle blades (9, 10).

retouch. Type B is characteristic of Yarmukian assemblages (Khalaily 2006:307).

Type C (Fig. 12:8).— This type, represented by 18 items (6.6%), differs from Types A and B in shape and retouch technique. These sickle blades were fashioned on wide, thick blanks and most of their dorsal and ventral sides were shaped by pressure retouch. This type also includes sickles made on thick flakes. The working edges are marked by shallow, irregular denticulation shaped by bifacial pressure retouch, while the opposite side also bears bifacial pressure retouch that covers a large portion of the circumference; thus, the working edges can only be identified by sickle gloss. This type is present in low frequencies in Yarmukian assemblages (Garfinkel and Miller 2002:162), and is more common in Jericho IX assemblages (Khalaily 1999:24).

Sickle Blade Varia (Fig. 12:9, 10).— Of the 45 tools in this category, the majority (n = 37) are sickle blades with retouched working edges, but without sickle gloss. The working edges of 17 tools were shaped by irregular denticulation, 14 by fine denticulation on the dorsal side, and 6 bear regular pressure retouch. The remaining eight tools were fashioned on bi-directional blade blanks, and the working edges were shaped by fine, continuous retouch mainly on the ventral surface. These tools are common in PPNB assemblages and probably originated in the PPNB occupation east of this locality.

Bifacials (Figs. 13–16)

Bifacials comprise 84 items (4.9% of the tools): 68 axes, 1 adze, 8 chisels, 2 picks, 2 discoids and 3 varia.

Axes.— All the axes were produced of local white-to-gray flint, carefully flaked and leaving almost no cortex. Their sections are usually oval. Most of the axes (n = 59) are robust, thick in the middle and then tapering toward the sides. All have straight sides and some have a pointed base (Figs. 13:1, 2; 14:1, 2). The working edges are usually arched, two are straight, and they are often polished (Fig. 13:1, 2). Eight fragments of axes exhibit polishing and signs of resharpening (Fig. 15:3). Seven axes were broken medially (termed 'Ḥula break', see Lechevallier 1978; Barkai 2005), and usually the active working edge is missing (Fig. 15:1, 2).

Adze.— One adze was shaped on a thick pebble (Fig. 16:1), the dorsal side bifacially flaked leaving remains of cortex, while the ventral side was completely retouched. One of the lateral sides was damaged and patina covers the break surface. The working edge is straight and well-shaped, and remains of polishing are visible, indicating that the tip was resharpened.

Chisels.— The eight chisels in this assemblage are atypical, and only their cross sections and working edges suggest their attribution to this type of tool (Fig. 16:2, 3). Five have plano-convex sections and narrow working edges, and two have triangular sections and their working edges were longitudinally flaked. The remaining item is a distinct, trihedral-shaped fragment. Trihedral-shaped chisels are common in later periods and most frequent in Chalcolithic assemblages (Gilead, Hershman and Marder 1995:259).

Picks.— Two picks were shaped by bifacial retouch and have pointed working edges. The heavy bifacial pick in Fig. 14:3 is elongated (154 mm) and has a bi-convex section. Cortex covers a limited area of the dorsal side. The pointed working edges bear signs of polishing. Heavy picks such as these appear in the PPNB assemblages at Beisamun (Lechavallier 1978:24).

The second pick is smaller, made of coarse gray flint with cortex on its dorsal surface. It has a bi-convex section and a pointed working edge.

Discoids.— The two items were carefully shaped on thick, rounded pebbles that have a bi-

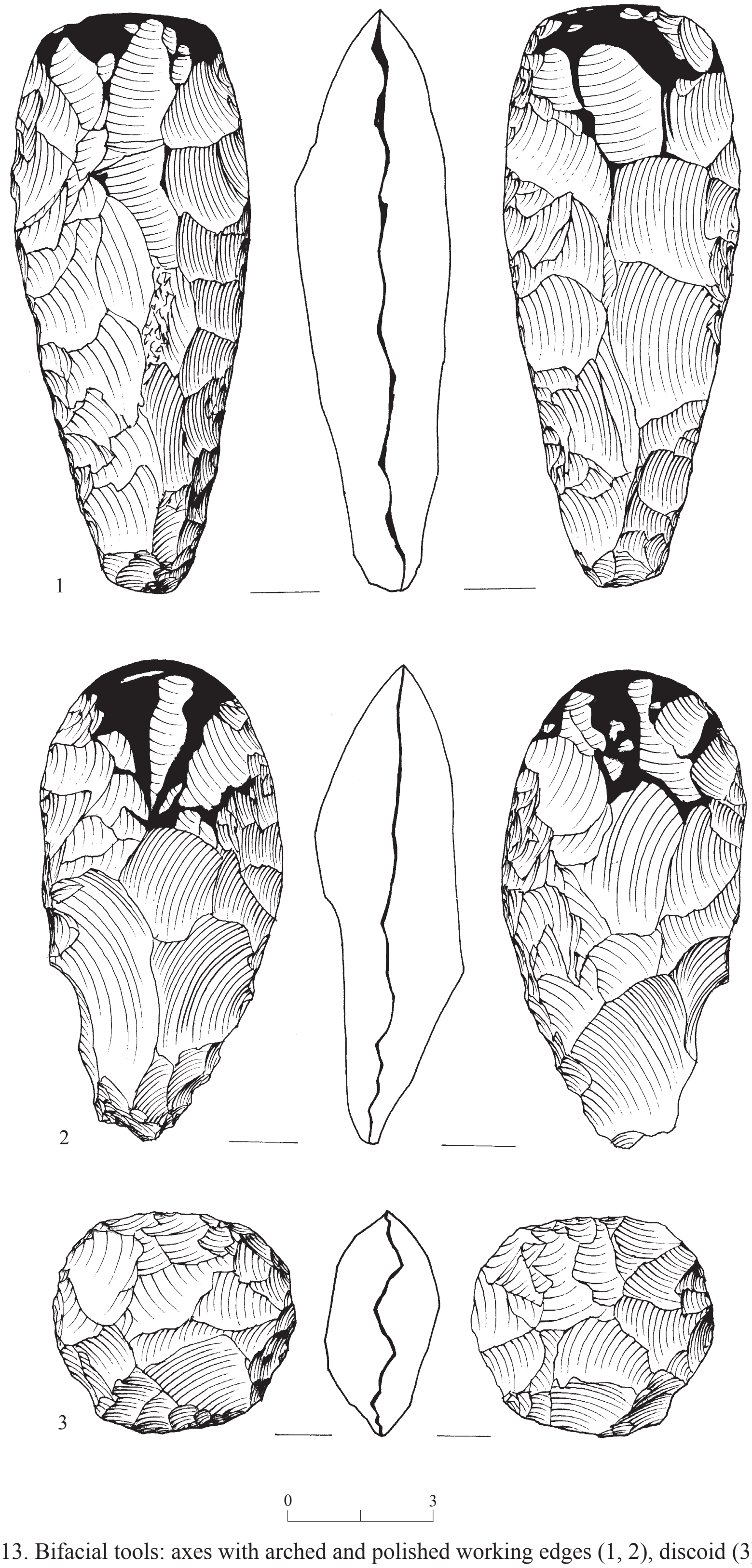


Fig. 13. Bifacial tools: axes with arched and polished working edges (1, 2), discoid (3).

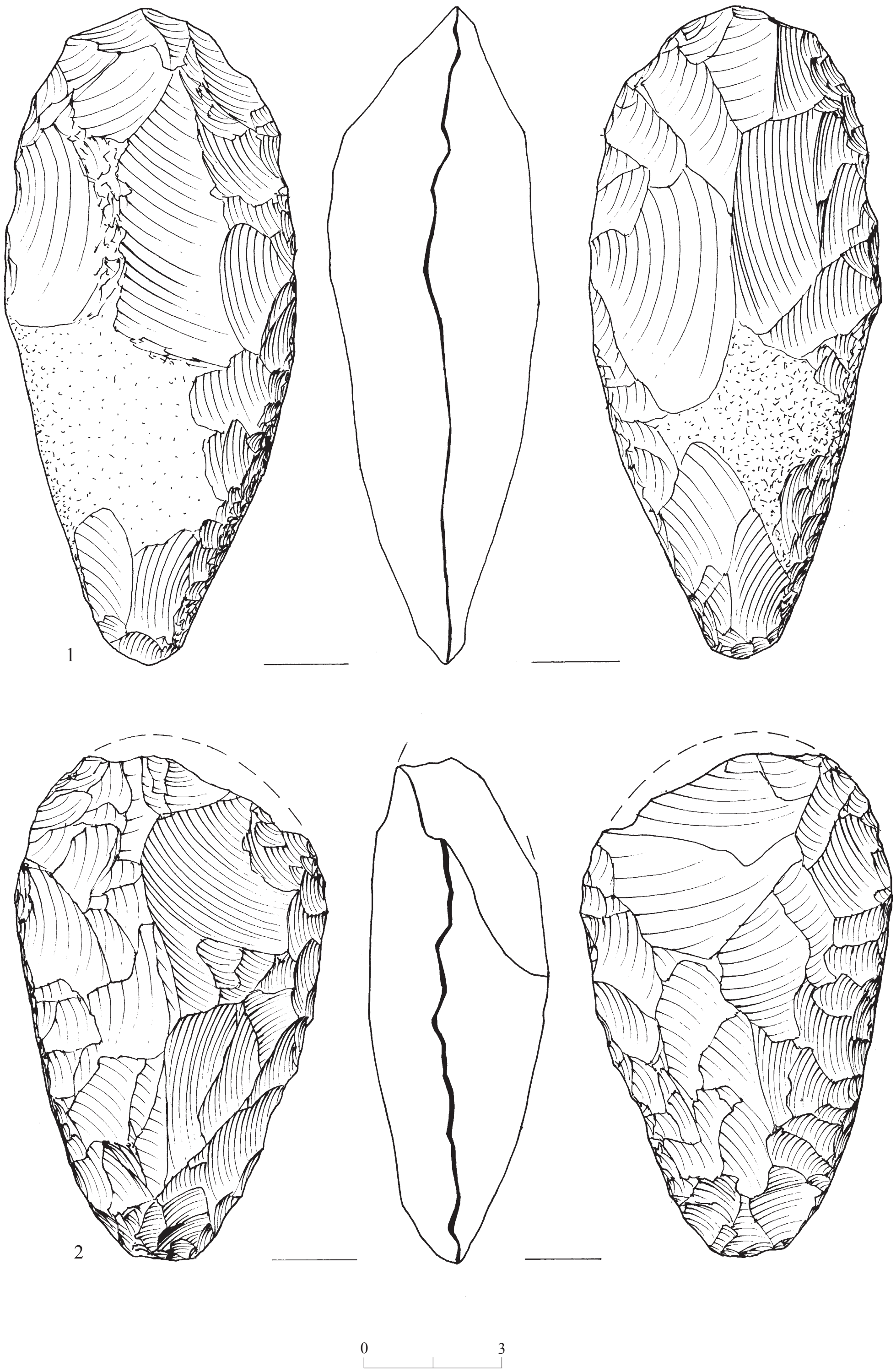


Fig. 14. Bifacial tools: unpolished axes with arched working edges (1, 2), massive bifacial pick (3).

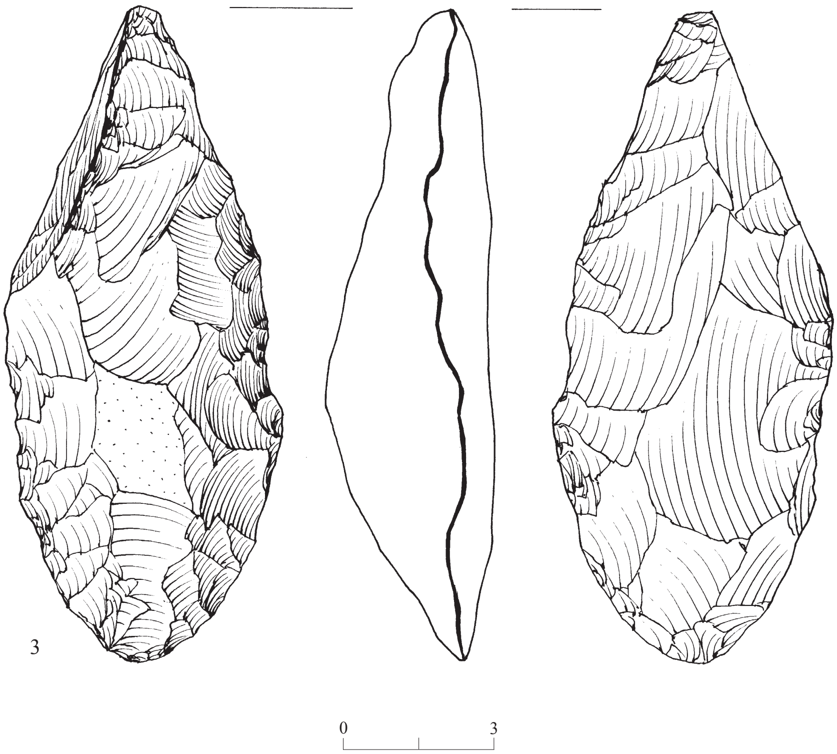


Fig. 14. (cont.)

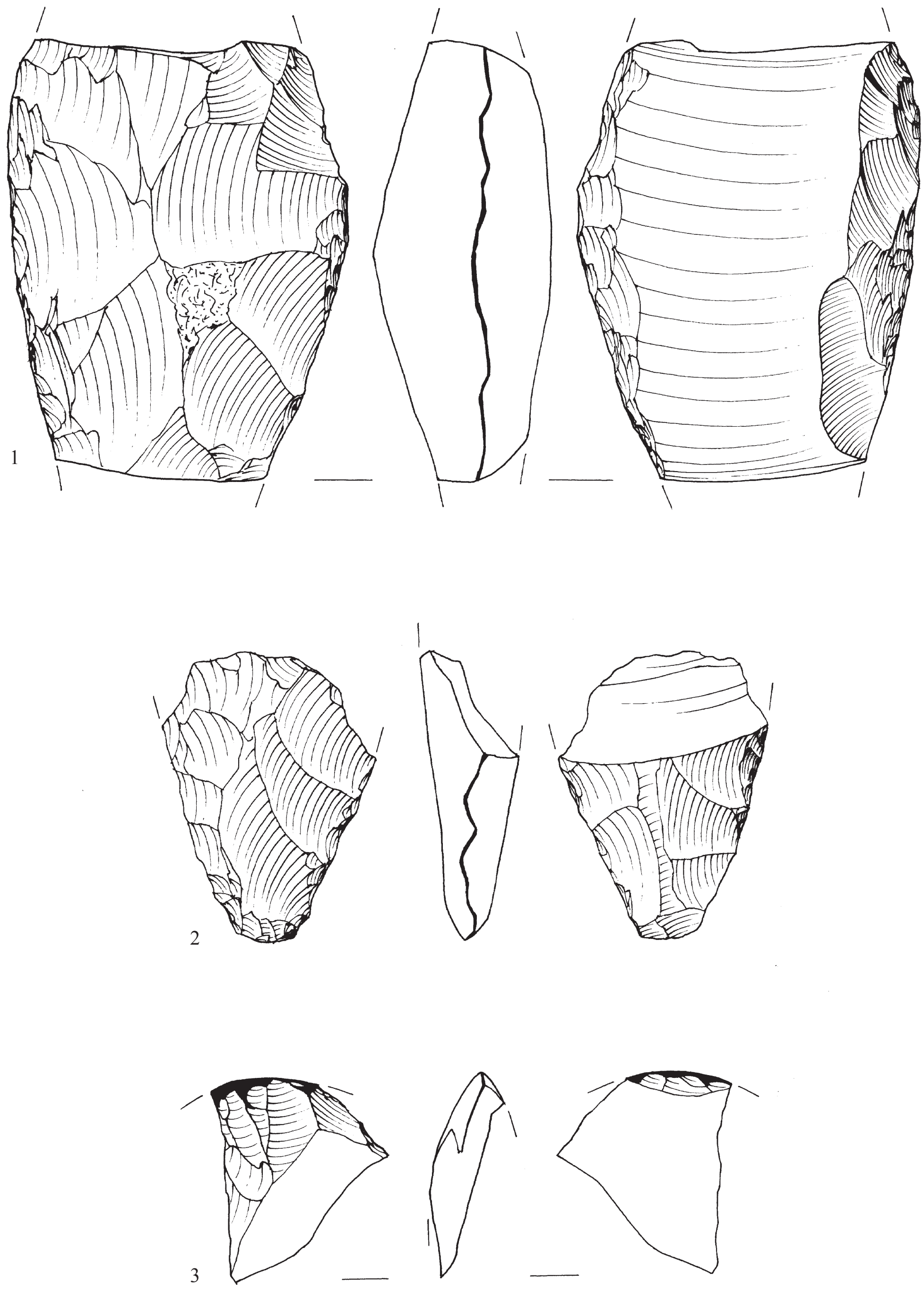
convex section. Their final shape was achieved by a robust bifacial flaking on both the dorsal and ventral sides, totally removing the cortex (Fig. 13:3), while their circumferences were delicately shaped by small flake removals.

Bifacial Varia.— Three bifacial tools were classified as varia. One is a core flake of dark brown flint, oval in section, bifacially flaked with a slightly polished working edge, while two other large flakes have bifacial retouch on their distal ends. We believe that these two latter items were flaked off in the process of preparing axes and discarded after knapping accidents.

Knives Formed by Pressure Flaking (Fig. 17)
These tools (n = 42; 2.4%) are characterized by the clearly convergent pressure retouch on one or two sides, which covers a major portion of the dorsal, and sometimes the ventral, side.

The majority of the tools in this category were shaped on blade blanks, with only a few on thick flakes or even core fragments. Most of the tools exhibit pressure retouch on one side, either the dorsal (n = 14) or the ventral (n = 14). Two items show pressure retouch over the entire ventral surface and two have alternate pressure retouch. Two of the items are only fragments.

The item in Fig. 17:1 is a segment of a large knife on a blade; the working edge was shaped by pressure retouch that extended deeply into the ventral surface, while the other edge exhibits limited pressure flaking on both sides. The example in Fig. 17:2 was shaped on a thick, broken blade blank. Its working edge was shaped by steep retouch that covers the dorsal side, while the ventral side shows fine retouch. The third knife, on the other hand, was shaped on the medial part of a thick, narrow blade (Fig. 17:3). Pressure flaking shaped one lateral edge,



1

2

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Fig. 15. Bifacial tools: axes with a 'Ḥula break' (1, 2), bifacial spall (3).

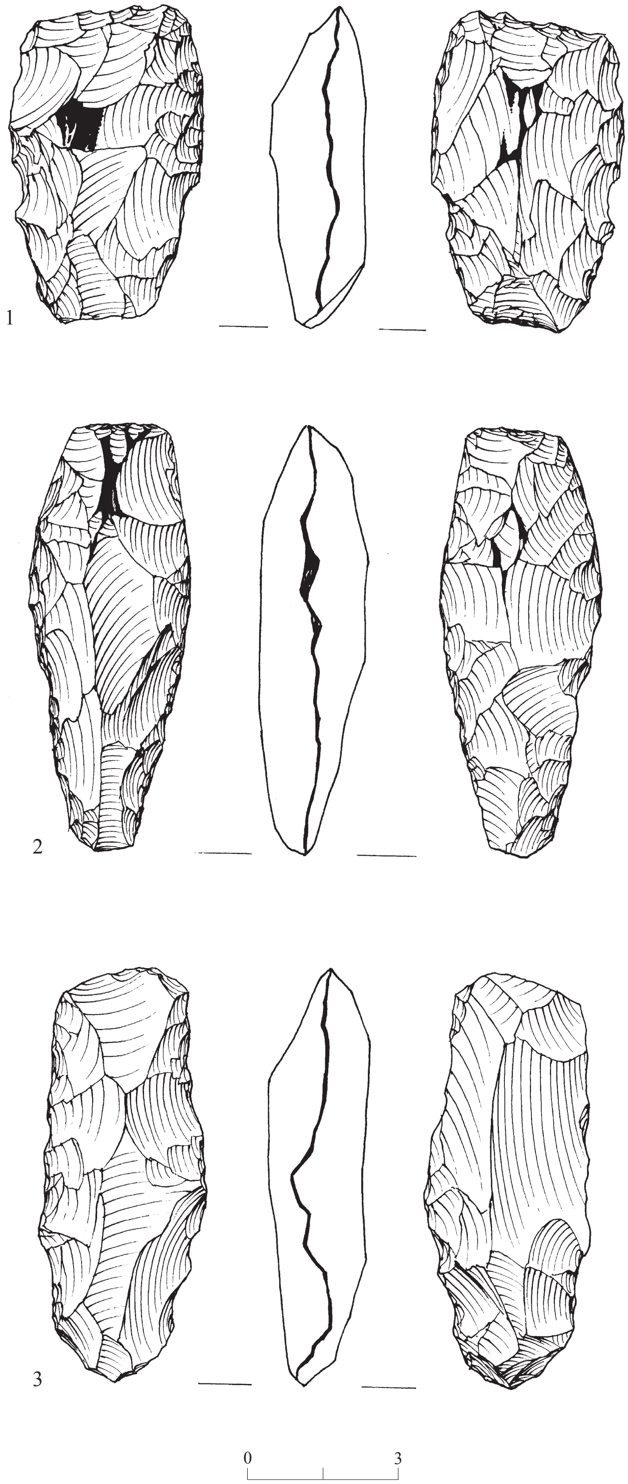

Fig. 16. Bifacial tools: adze (1), chisels (2, 3).

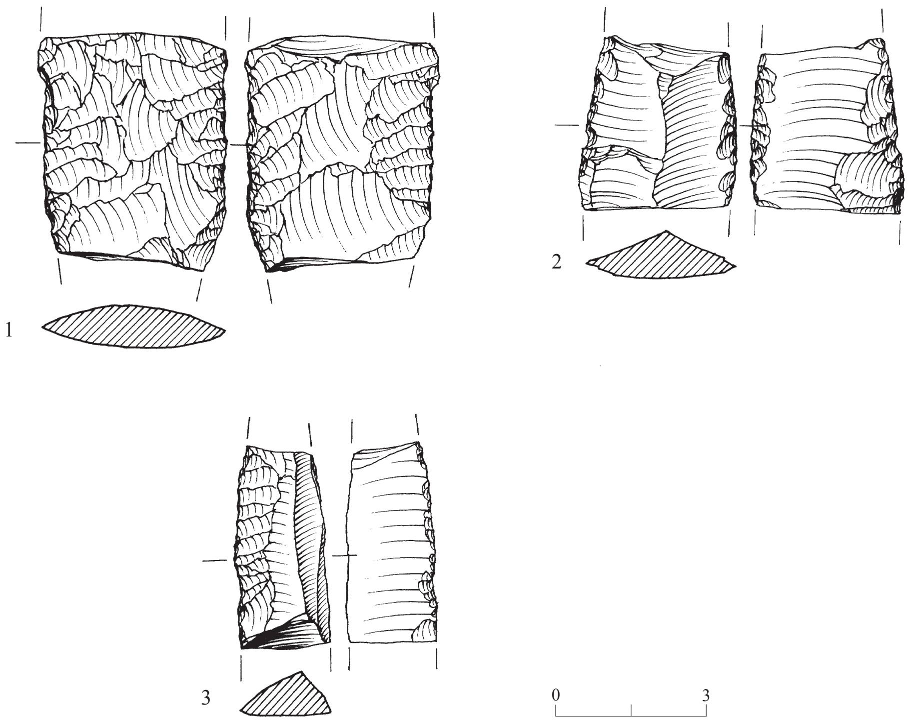

Fig. 17. Knives formed by pressure flaking.

mostly on the dorsal side, with fine retouch on the ventral side of the same edge.

Scrapers (Fig. 18)
The scrapers (n = 79; 4.6%) were all manufactured of local, whitish gray flint; 60% of the artifacts have cortex covering 10–30% of the surface. Double patina appears on several artifacts. Two-thirds of the scrapers were shaped on flakes or flake fragments, the remainder on either blades or thick pieces that could be core fragments (e.g., Fig. 18:4).

The scrapers are divided into five types: endscrapers (n = 32; Fig. 18:1–4), double end-scrapers (n = 3), rounded scrapers (n = 14; Fig. 18:5), side scrapers (n = 22; Fig. 18:6) and rounded cortical scrapers (n = 8). The preferred blanks were flakes, retouched flakes and flake fragments; only eight items were shaped on blade blanks. Most of the blade blanks have little or no cortex on their dorsal surface. A high variability is noted in the raw material of these tools, probably related to their ad-hoc nature.

Burins (Fig. 19; Table 4)
The 141 burins are divided into four types: 82 on blades (58.2 %), 47 on flakes (33.3%), 8 on core-tablet fragments (5.7%) and the remaining 4 on various pieces of cores. Over half of the burins were shaped on blade blanks flaked of local raw material with patina covering the dorsal and ventral surfaces.

Most of the burins (n = 63) were made on natural surfaces or breaks (44.7%; Fig. 19:1, 2), 19 on truncations (13.5%; Fig. 19:3), 7 are dihedral burins (Fig. 19:4, 5) and 22 are transverse burins (Fig. 19:6). The burin blows appear on one lateral side of the blank, usually from the distal toward the proximal end.

The burin to burin spall ratio is 1:1.5, indicating that burins were manufactured on site and can be considered ad-hoc tools.

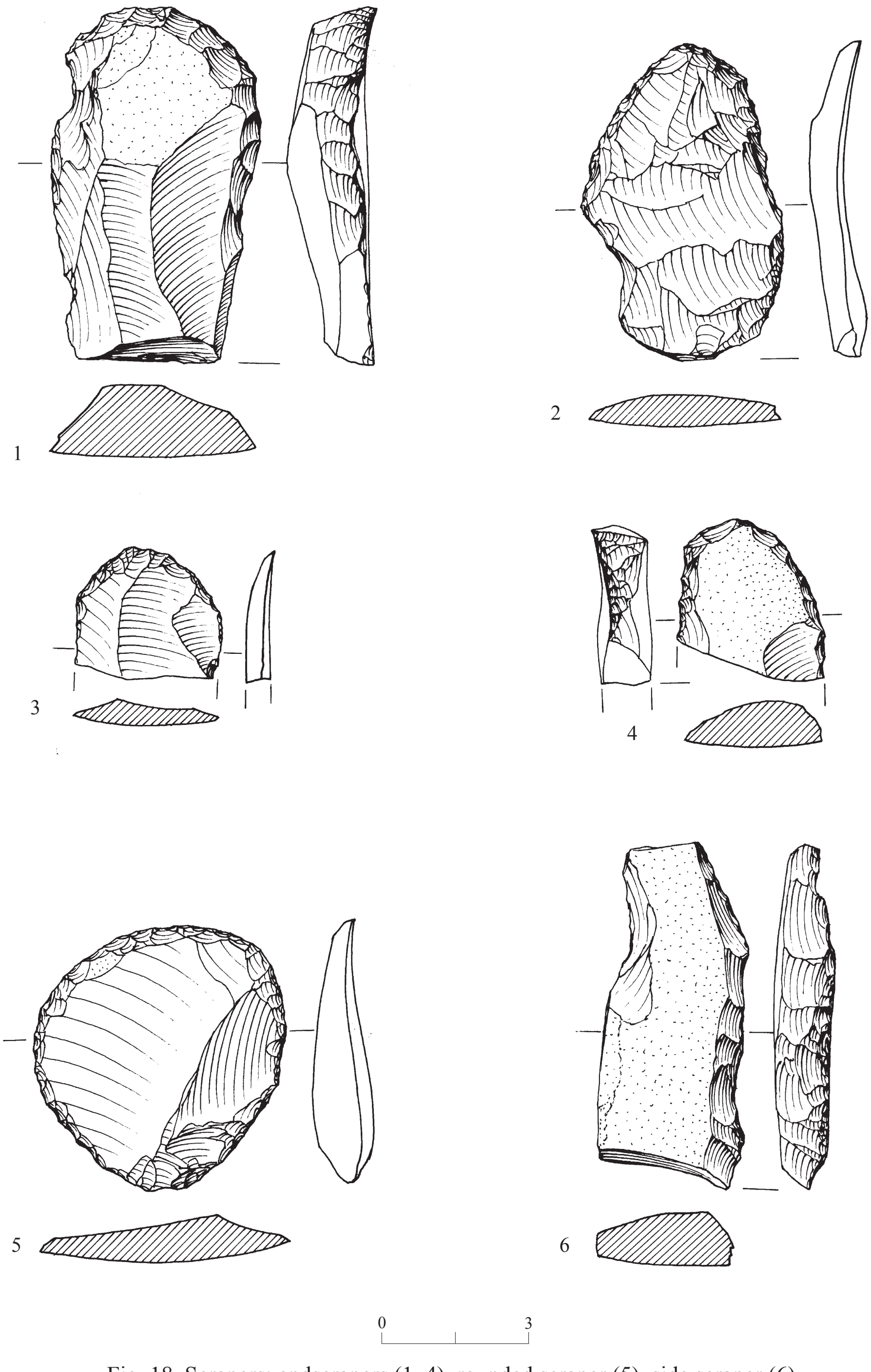

Fig. 18. Scrapers: endscrapers (1–4), rounded scraper (5), side scraper (6).

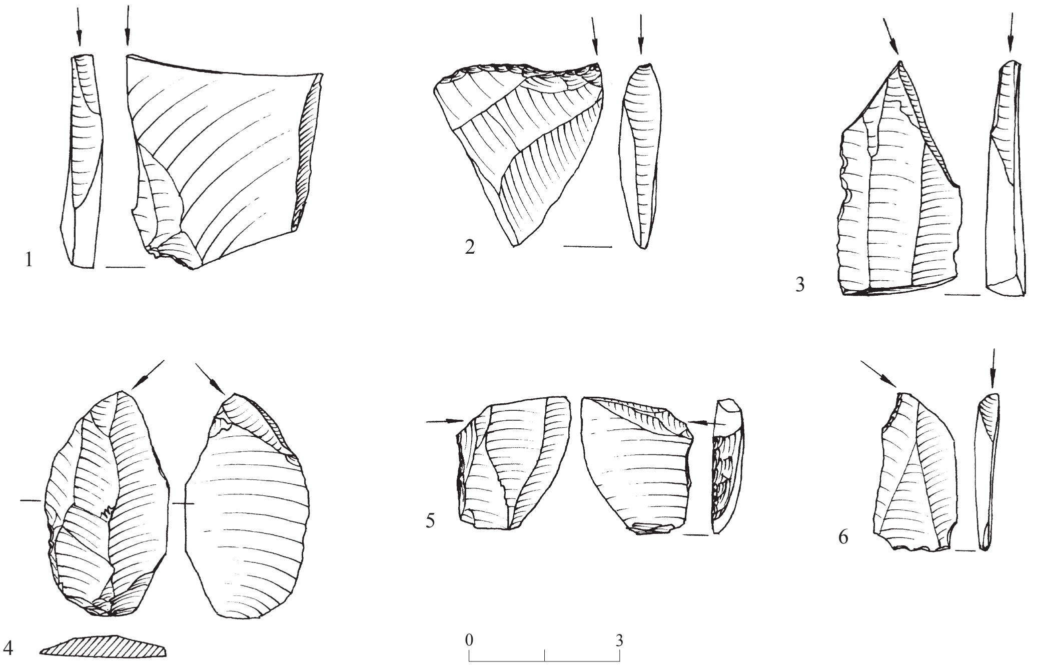

Fig. 19. Burins: burins on natural surface or break (1, 2), burin on truncation (3), dihedral burins (4, 5), transverse burin (6).

Table 4. Burin Types by Blanks

Type	On Blades	On Flakes	On Core Tablets	On Core Fragments	Total	%
Burins on breaks or natural surfaces	20	36	6	1	63	44.7
Burins on truncations	17	1		1	19	13.5
Burins on retouched surfaces	4	3			7	5.0
Burins on notches	1		1		2	1.4
Transverse burins	17	3		2	22	15.6
Double burins	16	4	1		21	14.9
Dihedral burins	7				7	5.0
Total	*82 (58.2%)*	*47 (33.3%)*	*8*	*4*	*141*	*100.0*

Perforators

This category comprises 43 awls (Fig. 20:1–5) and 26 borers (Fig. 20:6–8). The flakes chosen for manufacturing awls were large and thick, the drilling point formed either by two notches (Fig. 20:1–3) or by limited abrupt retouch along both edges (Fig. 20:4, 5). Borers, however, were modified by continuous abrupt retouch, and the length of the point comprises half of the length of the item (Fig. 20:6–8). There is a clear distinction in raw material between awls and borers, as awls were generally shaped on whitish or beige flakes, while gray flint with black spots was chosen for borers.

The remaining ten items are defined as massive drills, longer than 8 cm and usually fashioned on thick, elongated blanks.

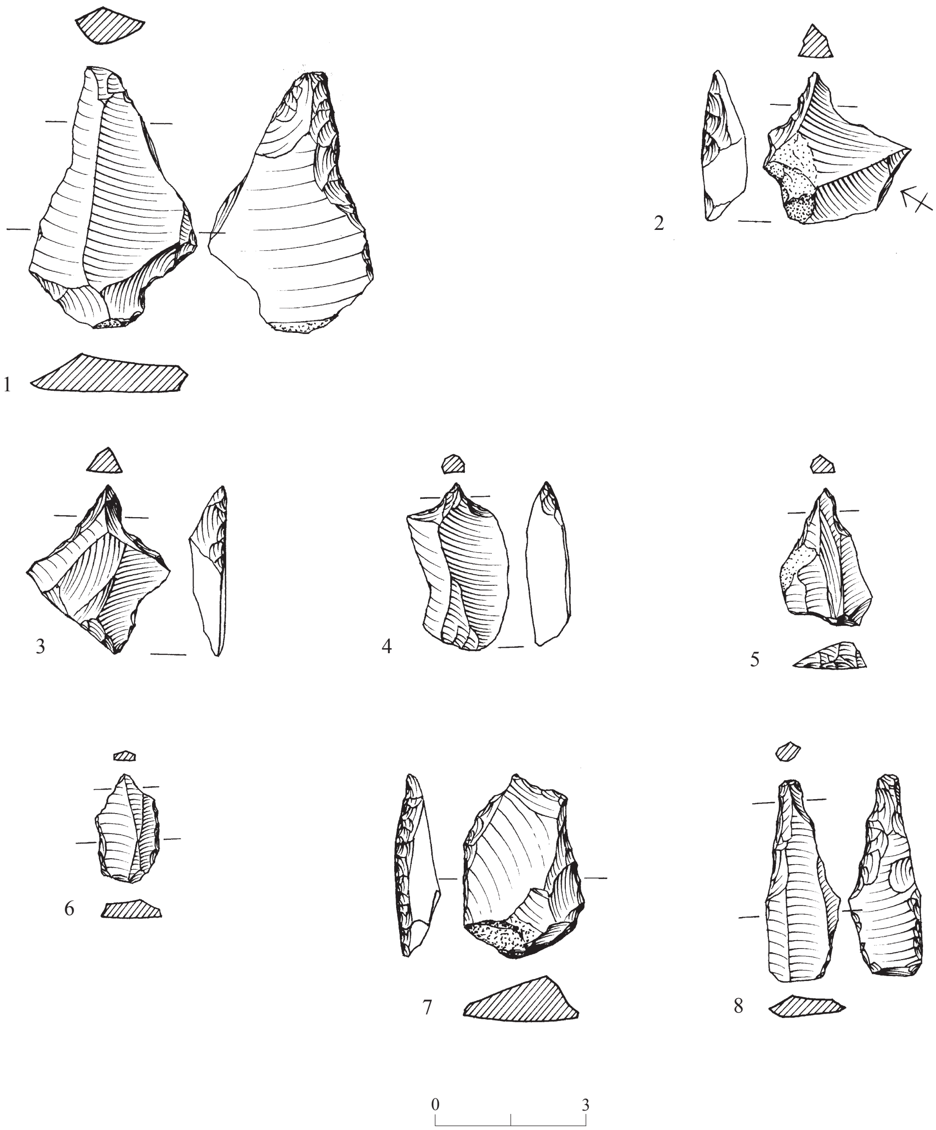

Fig. 20. Perforators: awls (1–5), borers (6–8).

Notches and Denticulates

These items were abundant in the assemblage, comprising 17.5% (n = 302) of the tools. Both wide notches and denticulated pieces often exhibit additional retouch along the lateral edges. Single notches are dominant. Compound notches, usually a set of irregularly spaced notches, appear on both flake and blade blanks.

Denticulates on large flakes, 5.5–8.5 cm in length, display irregular denticulation along one or two edges. Two artifacts had denticulation along both lateral edges and the distal end.

Retouched Blades and Bladelets

This is the most frequent category in the assemblage, similar in number to the category of notches and denticulates, comprising 18.3% (n = 316) of the tools. The preferred raw materials for the production of retouched blades were the same as those for sickle blades—local gray flint and dark gray flint with white spots.

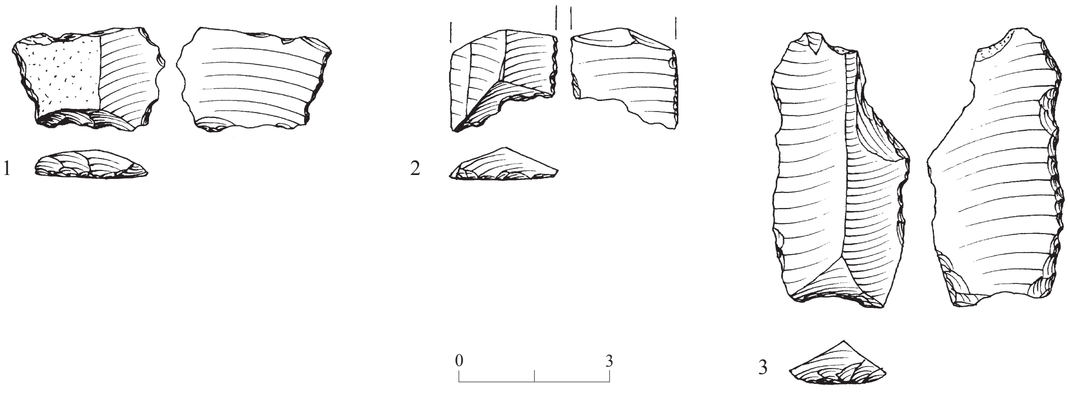

Fig. 21. Truncations: straight truncation (1), convex truncations (2, 3).

The most common retouch is fine regular, but some blades exhibit limited scalene retouch on their ventral surface; 179 exhibit fine retouch on one lateral side, 109 on both sides, while 28 items are considered backed blades—semi-abrupt to abrupt retouch was detected on one lateral side, and the retouch was not continuous, covering up to half the length of the items.

Retouched Flakes

Retouched flakes are also common in the assemblage, comprising 15.7% (n = 272). Retouched flakes are defined as those that exhibit continuous regular retouch for more than 1 cm along their edge. This criterion is essential to differentiate them from artifacts with apparent retouch that was actually caused by natural damage, and thus these items were carefully examined. All were manufactured of local raw material ranging in color from whitish, the most frequent, to gray and dark gray in lesser quantities. The retouched flakes can be divided according to size: 47 are large, 155 are medium-sized and 70 are small. In some cases, irregular retouch appeared along a single edge, partially on the dorsal surface and partially on the ventral, in addition to the regular retouch.

Truncations (Fig. 21)

Of the 50 truncated items, 62% are on complete or broken blades, 30% on flakes, and the remainder, on chunks. Truncations appear on a wide range of medium- to good-quality raw material, and there is no clear shaping technique; therefore, they are considered ad-hoc tools. In general, the truncation is located on the distal end (e.g., Fig. 21:1), with 28% of the items exhibiting truncation on the proximal end (Fig. 21:2, 3) and 8% on both ends. Most of the items (88%) were shaped by semi-abrupt retouch from the ventral to the dorsal sides. The truncated items are divided into three categories: straight (32%; Fig. 21:1), diagonal (30%), and convex truncations (22%; Fig. 21:2, 3), while 14% are similar to a wide notch.

Multiple Tools

This category, comprising 2.4% (n = 42) of the tools, includes items that were designed as tools with double use. They are dominated by burins combined with other types of tools, such as scrapers (n = 9), denticulates (n = 9), notches (n = 4) and perforators (n = 6). The remaining 14 items are combinations of scrapers and perforators.

Discussion

It is clear from the techno-typological analysis of the flint assemblage from Layers I and II that all the major categories of the Early PN are represented, and the relative frequencies indicate an on-site flint industry. The analysis also reveals a significant change in technological behavior during this period, especially when compared to that of the PPNB period. The most prominent changes are the shift from blade to flake technology, as reflected in both the dominance of flakes and flake cores, and the decline and disappearance of the naviform technology and its products. The mode of production was flexible, little effort was invested in the shaping of cores, and many nodules were knapped without any preparation. This flexibility is also reflected in the shaping of the tools. The majority of the tools (c. 76%) were simple expedient types, produced mainly on flakes, based on local household production. Arrowheads and sickle blades, nevertheless, continued as in previous periods to be shaped on standardized blades. The high investment involved in shaping these two tool categories, evident in the use of pressure retouch, suggests a tendency toward craft specialization. A prominent difference is also apparent between PPNB tools and the formal tools from Early PN assemblages, as expressed in the retouching technique and more specifically, in the fashioning of the working edges.

The arrowhead assemblage from these layers is distinct, comprising only two large types, Byblos and Amuq (Gopher 1989:92; 1994:39), both shaped mainly by pressure retouch. A similar phenomenon is also reported at Tel Yosef in the Jezreel Valley, where most of the arrowheads are of these two large types (Khalaily 2006:316). However, the Amuq points in both these assemblages differ in style from those of the PPNB (Gopher 1989:144–148; 1994:36–42). The majority of the sickle blades display coarse, deep, irregular denticulation on their working edges, mainly fashioned by bifacial pressure retouch.

Such arrowheads and sickle blades are found in many Yarmukian assemblages of the southern Levant, such as Sha‘ar Ha-Golan (Stekelis 1972; Garfinkel 1992; 1993; 1999; Garfinkel and Miller 2002), Munḥata (Perrot 1972; Gopher 1989), ‘Ein Ghazal (Rollefson and Simmons 1986; Rollefson 1993; 1998) and Jericho (Crowfoot-Payne 1983:684). However, they most closely resemble assemblages of this period in the Ḥula Basin, as at Tel Ro‘im West (Nadler-Uziel 2007; Nadel and Nadler-Uziel 2011), Tel Te’o (Gopher and Rosen 2001:53), and, to a certain extent, Layers VI–V at Ha-Gosherim (Khalaily and Vardi, forthcoming).

Based on these observations, the Beisamun flint assemblage of Layers I and II in Areas A, B and C should be attributed to the Early PN industries. The composition of the tool kit, and the analysis of the arrowheads and sickle blades, enable us to assign this assemblage to a local culture contemporary with the Yarmukian culture of the southern Levant, but distinct to the region of the Ḥula Basin. The absence of certain tool types, such as small arrowheads, does not allow its assignation to the typical Yarmukian culture (Yegorov 2011:65).

Pottery

Dozens of clay fragments and lumps were observed in all the excavated squares in Areas A and B. However, only 16 poorly preserved pottery sherds were recovered, often crumbly, and at least half are body sherds that are not chronologically diagnostic. The characteristic ware has a yellow-to-reddish surface color and most have a high vegetal component. They were poorly fired, as indicated by the thick, gray core. The sherds vary in thickness from 12 to 20 mm, and most of the body sherds are slightly curved.

Four rim fragments and four additional handles are described here. Three of the four rims are of deep bowls (Fig. 22:1–3). Two vessels (Fig. 22:2, 3) have rounded rims and thick straight walls, and the vessel in Fig. 22:1 has a wide, semi-rounded knob handle under the rim. The proposed reconstruction of this latter vessel is of a medium to large bowl with thick walls and a squared rim. The sherd in Fig. 22:2 has a thin coating of red pigment on the surface and perhaps traces of burnishing, while the rim in Fig. 22:3 has a slightly curved wall and a lug handle attached to the lower body. The exterior was decorated with burnished red slip.

Three additional handles were classified as lug handles. Such handles were usually attached

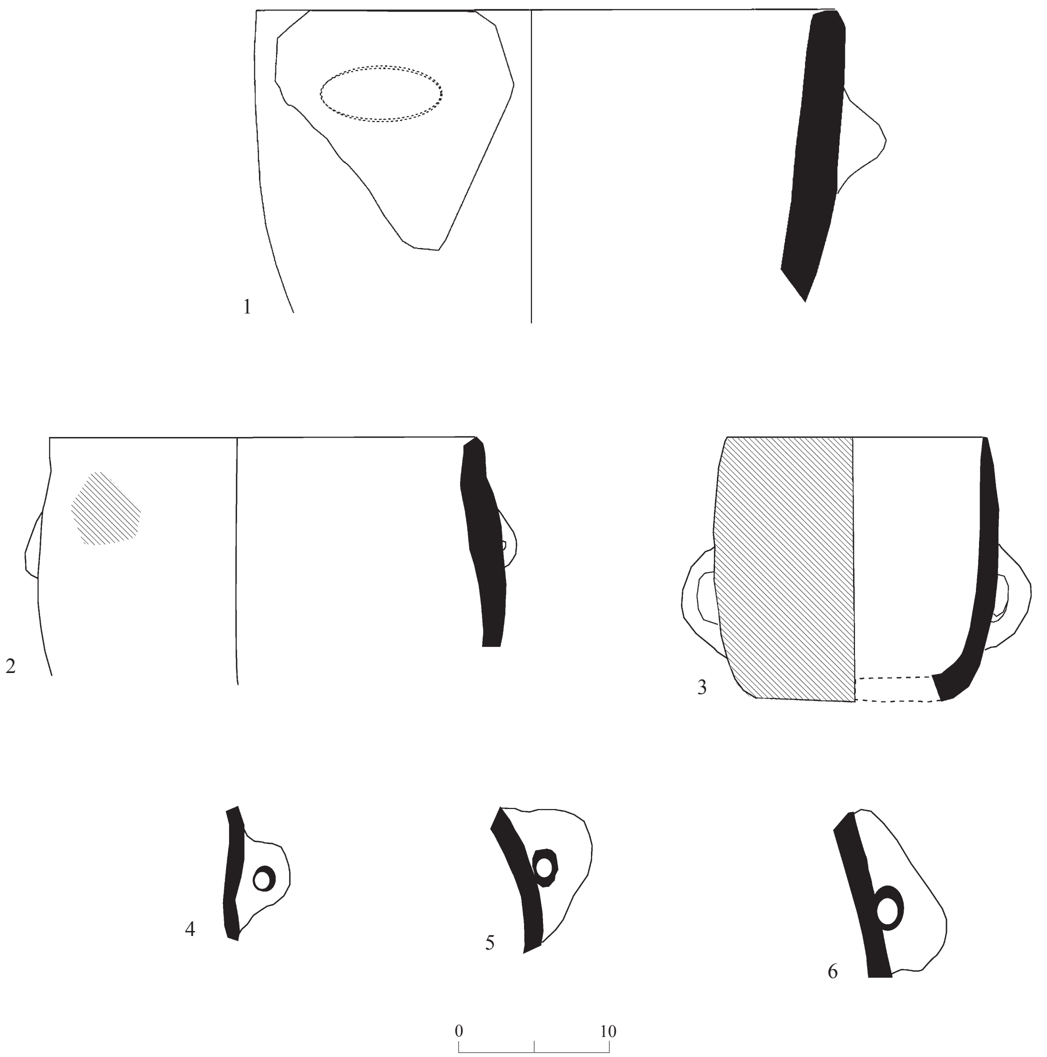

Fig. 22. Pottery vessels.

No.	Type	Area	Square	Basket	Description
1	Deep bowl	A	X11	1050	Light brown clay, brown core, small gray grits
2	Deep bowl	B	X16	2057	Dark brown clay, dark core, small gray grits, dark red burnish
3	Deep bowl	A	X11	1075	Brown clay, gray core, small grits, red burnish
4	Lug handle	B	X19	2065	Beige clay, dark core, few small gray grits
5	Lug handle	B	X18	2048	Light brown clay, gray core, small gray grits
6	Lug handle	A	X10	1056	Brown clay, dark core, gray grits

vertically to the bodies of small- and medium-sized vessels (Fig. 22:4–6). They range in size from 3 to 5 cm in length and bear no slip or incisions.

The Early PN sherds in this assemblage display few decorative motifs, apart from surface treatment and some burnishing. The decorative hallmarks of the Yarmukian culture, such as herringbone incisions and combinations of red slip and incisions (Stekelis 1966; Garfinkel 1992:56; 1993:123; Gopher and Gophna 1993:311; Garfinkel and Miller 2002:97), are absent in this assemblage

In summary, the few pottery sherds from the present excavation are not representative, although the fabric and bowl shapes can be definitely associated with Early PN vessels (Goren 1991:43; Gopher 1995) and resemble the Yarmukian pottery from Sha‘ar Ha-Golan (Stekelis 1950–1; 1972), Munḥata (Garfinkel 1992), ‘Ein Ghazal (Rollefson, Simmons and Kafafi 1992) and Wadi Shu‘eib (Simmons et al. 1989; 2001).

GROUNDSTONE TOOLS AND VESSELS

The groundstone assemblage recovered in all layers of Areas A and B consists of 98 items, most of them from fills related in some way to the excavated structures; 12 items (12.5%) were recovered *in situ* in defined loci, mainly in Area A. Among the 98 items, only 79 are identified; 19 could not be typologically assigned due to their small size. The bulk of the identified items (c. 75%) comprises grinding and pounding tools, the remainder are flaked tools (8.2%), debitage (2%) and vessels (9.2%; Table 5). The majority of the items are fragmentary (n = 43) or broken (n = 26), and only 29 are complete. In spite of these difficulties, most of the items can be assigned to the Pottery Neolithic (PN) horizon of the southern Levant, based on typology, and in several cases, the specific dates of items can be addressed. We utilize here the typology of Wright (1992), with references to the works of Gopher and Orelle (1995) and Milevski (Milevski 1998; Getzov et al. 2009:96–98, 121–125).

Raw Materials and Technology

The majority of the stone tools were made of basalt (c. 52%) or limestone (c. 37%), with limestone somewhat more frequent in Area B (Table 6). These raw materials can be considered local resources, originating, for example, on the western shore of the Sea of

Table 5. General Breakdown of the Groundstone Assemblage

Area / Types	A		B		Trenches and Top soil		Total	
	N	%	N	%	N	%	N	%
Grinding stones	4	5.6	3	13.7	2	50.0	9	9.2
Mortars	3	4.2	1	4.5			4	4.1
Pounders	15	20.8	3	13.7			18	18.4
Hammerstones	3	4.2	3	13.7			6	6.1
Rubbing stones	11	15.3	1	4.5	1	25.0	13	13.3
Polishers and burnishers	3	4.2					3	3.1
Worked pebbles and cobbles	1	1.4	2	9.1			3	3.1
Recycled tools	1	1.4			1	25.0	2	2.0
Multiple tools	1	1.4					1	1.0
Flaked tools	7	9.7	1	4.5			8	8.2
Debitage	1	1.4	1	4.5			2	2.0
Vessels	7	9.7	2	9.1			9	9.2
Weapon? figurine?	1	1.4					1	1.0
Unidentified items	14	19.4	5	22.7			19	19.4
Total	*72*	*100.0*	*22*	*100.0*	*4*	*100.0*	*98*	*100.0*

Galilee, or in the Golan plateau for the basalt (Philip and Williams-Thorpe 2000; Williams-Thorpe, forthcoming). Other raw materials, such as flint, chalk, sandstone and pumice, appear in smaller quantities, with one item (a rubbing stone) probably made of dolomite. Tool blanks were generally limestone or basalt blocks, while a number of pebbles and cobbles were also utilized (c. 6% of the blanks). Vessels were made of the different raw materials in almost equal numbers. The groundstone tools were fashioned mainly by grinding, polishing and abrading, with some tools (e.g., grinding stones, hammerstones and rubbing stones) showing signs of pecking. Bowls were made by drilling and were probably polished in the final stages of manufacture (Iovino and Lemorini 2001; Altinbilek et al. 2001).

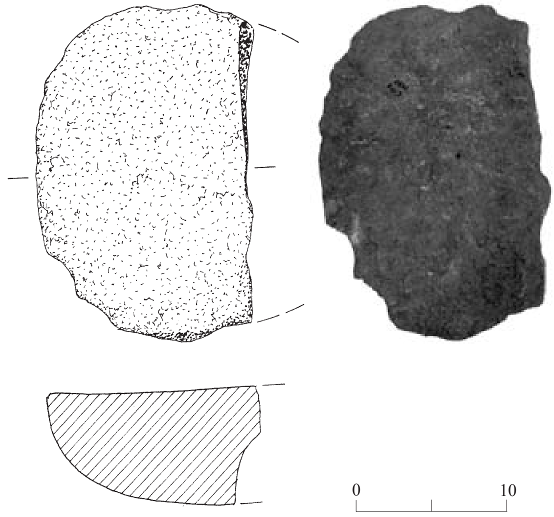

Fig. 23. Lower grinding slab, limestone (Area A, Sqs X11–12).

Tools (Table 5)
Grinding Stones (N = 9).— Most of the grinding stones, made of basalt or limestone, were found in fragmentary condition. The lower grinding stone in Fig. 23 has a shallow, concave working surface and a rounded base.

Table 6. Breakdown of the Groundstone Assemblage According to Raw Material

Types / Area	A		B		Trenches and Top Soil		Total	
	N	%	N	%	N	%	N	%
Tools								
Basalt	34	52.4	10	50.0	2	50.0	45	51.7
Limestone	22	33.8	9	45.0	2	50.0	33	37.1
Flint	3	4.6					3	3.4
Chalk	2	3.1					2	2.2
Pumice	1	1.5	1	5.0			2	2.2
Ferruginous sandstone	1	1.5					1	1.1
Sandstone	1	1.5					1	1.1
Dolomite?	1	1.5					1	1.1
Subtotal	*65*	*99.9*	*20*	*100.0*	*4*	*100.0*	*89*	*99.9*
Vessels								
Limestone	1	14.3	1	50.0			2	22.2
Chalk	2	28.6					2	22.2
Ferruginous sandstone	1	14.3	1	50.0			2	22.2
Basalt	1	14.3					1	11.1
Unknown	2	28.6					2	22.2
Subtotal	*7*	*100.1*	*2*	*100.0*			*9*	*99.9*
Total	*72*		*22*		*4*		*98*	

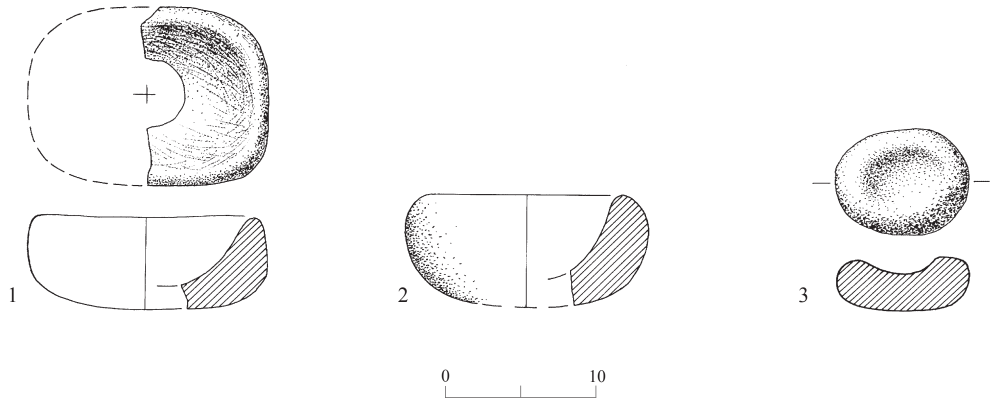

Fig. 24. Mortars.

No.	Area	Square	Basket	Description
1	A	X10	1056	Limestone, striation marks
2	A	X11	1057	Limestone
3	B	X16	2008	Limestone

This form was labeled a 'processor' by Gopher and Orelle (1995: Fig. 22) and corresponds to their Type B2a, which is well-represented in the PN assemblage at Munḥata.

Mortars (N = 4).— Mortars are poorly represented in this assemblage (c. 4%). They are small- to medium-sized items, made of limestone or chalk, and have a deeply concave, oval or irregular working surface (Fig. 24). The broken mortar in Fig. 24:1, with striation marks on the working surface, was recovered in Room 106 in Area A, along with the mortar in Fig. 24:2 and the stone platter in Fig. 28:2. The mortar in Fig. 24:3 is smaller, with an oval-shaped body.

Pounders (N = 18).— Pounders are the most frequent groundstone tool in the assemblage, most of them made of basalt with an elongated (Fig. 25:1) or ovoid (Fig. 25:2, 3) shape. Two of the pounders (Fig. 25:1, 2) were found in Room 101 in Area A. The item in Fig. 25:2 bears traces of ochre on the working surface. A fragment of an unidentified tool (not illustrated) also exhibits traces of ochre.

Hammerstones (N = 6).— The hammerstones were made of limestone, basalt or flint, and are spheroid (Fig. 25:4), parallelepiped or ovoid in shape, with six working surfaces (Fig. 25:5, 6). The example in Fig. 25:5 represents the characteristic parallelepiped hammerstone made on a flint nodule with surfaces shaped by pecking.

Rubbing Stones (N = 13) — This is the second largest tool type in the assemblage, composed of items with oval, discoidal (Fig. 25:7, 8) or parallelepiped (Fig. 25:9) bodies.

Polishers and Burnishers (N = 3).— These are items that show signs of having been utilized to polish or burnish different materials (limestone, sandstone, flint, pottery?).

Worked Pebbles and Cobbles (N = 3).— This tool type includes pebbles and cobbles that were modified by abrasion and polishing, although their function is uncertain.

Recycled and Multiple Tools (N = 3).— Two recycled tools and one multiple tool were

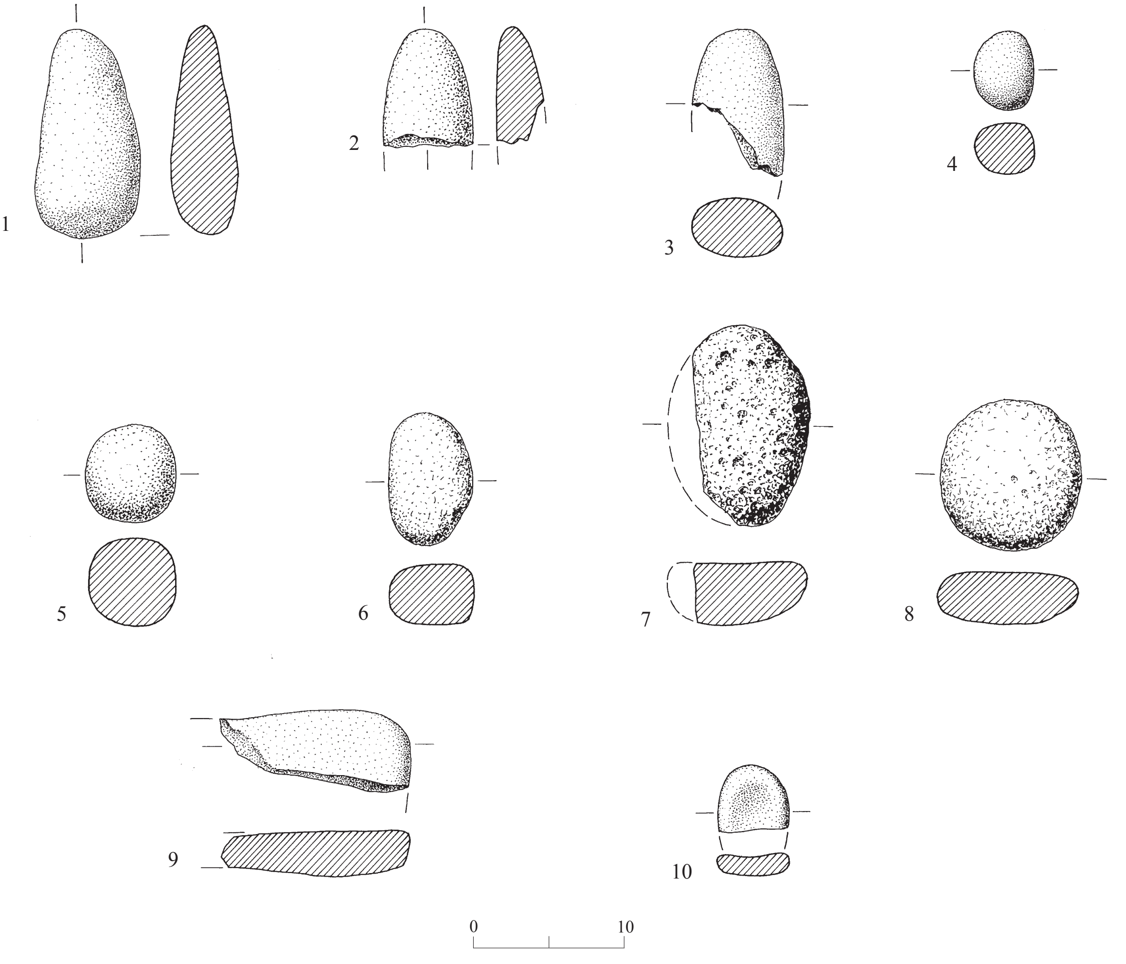

Fig. 25. Groundstone tools.

No.	Type	Area	Square	Basket	Description
1	Pounder	A	X11	1012	Basalt
2	Pounder	A	X11	1012	Basalt
3	Pounder	A	X13	1084	Limestone
4	Hammerstone	A	W11	1082	Basalt
5	Hammerstone	A	X12	1048	Flint
6	Hammerstone	A	X12	1042	Limestone
7	Rubbing stone	A	X11	1011	Limestone
8	Rubbing stone	A	X10	1072	Basalt
9	Rubbing stone	A	X12	1029	Dolomite(?)
10	Recycled tool	A	X12	1042	Sandstone

recovered. The recycled items comprise one worked pebble transformed into a tiny mortar (Fig. 25:10), and a rubbing stone that was also converted into a small mortar. The only multiple tool combines a rubbing stone with a pounder.

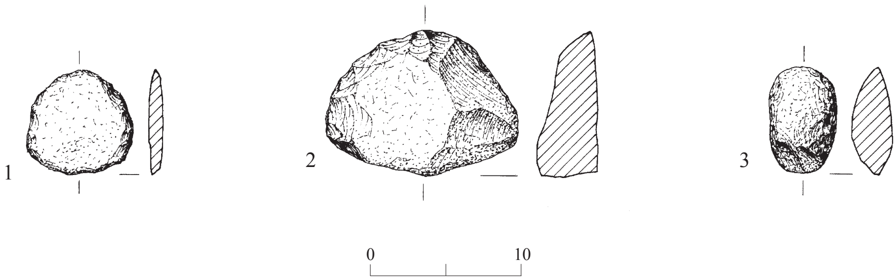

Fig. 26. Flaked limestone tools.

No.	Type	Area	Square	Basket
1	Scraper	A	X13	1011
2	Flaked cobble	B	X16	2022
3	Bifacial	A	X10	1015

Flaked Tools (N = 8).— Flaked tools are limestone or chalk items that were flaked in the same technique as flint tools. Most are scrapers (Fig. 26:1), while two are flaked cobbles (Fig. 26:2) that are defined as discs or stoppers (Rosenberg, Getzov and Assaf 2010). Similar items were found at Munḥata in PN Layer 2B (Gopher and Orelle 1995: Fig. 36:11). A single bifacial tool (Fig. 26:3) is similar to PN (Yarmukian) chipped flint adzes, or adze rough-outs, found at Naḥal Zehora II (Barkai 2005:199–211). Finally, a retouched basalt flake was also discovered.

Debitage (N = 2).— One basalt flake and a limestone core tablet are part of the assemblage. These two items and the retouched basalt flake (see above), may indicate some on-site flaking, although it is difficult to ascertain to which stone items they are related.

Vessels

Nine groundstone vessels were found at Beisamun, most of them bowls (n = 7), along with one platter and a handle.

Bowls.— Seven bowls were found. Three bowls are open, shallow vessels with round upright, everted or inverted rims made of soft limestone (Fig. 27:1). Rowan (1998:124–131) labeled this form Class 1, and ascribed it to several phases of the late PN. At Munḥata, such bowls represent a homogeneous assemblage (Gopher and Orelle 1995: Fig. 18) defined as shallow concave bowls (Type A3); they appeared mainly in PN Levels 2B–A. Some examples of these bowls were recovered in the excavations conducted by Lechevallier (1978: Fig. 69) at Beisamun, and were published as belonging to the PPNB, although it is apparent that PN material was also encountered in her excavations (Bocquentin et al. 2011). A deep bowl with a sharpened rim and rounded, upright walls (Fig. 27:2) was made of hard limestone. This belongs to Rowan's Class 4, Type 4B (1998: Fig. 28A). At Munḥata, similar rims appeared in several strata and were included in Type A3 (Gopher and Orelle 1995: Fig. 18:1–3, 5).

Two pedestal bowls were recovered, one made of hard limestone (Fig. 27:3) with plastering evidence on the pedestal base. On initial observation, it was attributed to the category of 'white vessels' (e.g., de Contenson and Courtois 1982; Goren and Goldberg 1991), but closer examination revealed it to be a stone vessel with a plaster coating. The second example is a small fragment of a basalt bowl with remnants of a pedestal. Similar hollow-pedestal bowls were also included by Rowan

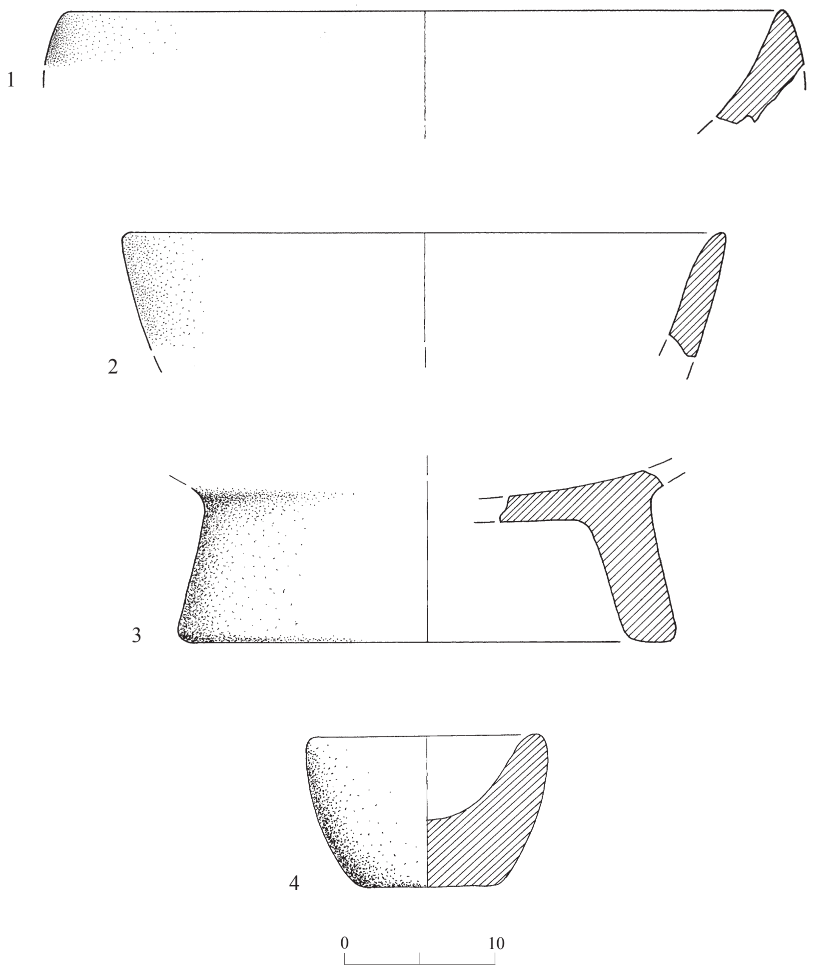

Fig. 27. Stone vessels.

No.	Type	Area	Square	Basket	Description
1	Bowl	A	X11	1009	Soft limestone
2	Deep bowl	B	X16	2022	Hard limestone
3	Pedestal	A	X7 (trench)	1068	Hard limestone
4	Small thick bowl	A	X10	1069	Soft limestone

in Class 4, Type 4B (1998:159). Both these vessels were found in clear PN contexts in Layer II, although such pedestal vessels usually appear in later stone-vessel assemblages.

A small deep bowl with a round rim, rounded upright walls and a thick base made of soft limestone (Fig. 27:4) is similar to Type A4 at Munḥata (Gopher and Orelle 1995: Fig. 19:5). These bowls usually appeared late in the PN or in the Early Chalcolithic period, and represent the predecessors of the Chalcolithic V-shaped bowls. It belongs to Rowan's Class 2, and he reports a parallel at Gat Guvrin (Wadi Zeita; Rowan 1998: Fig. 17: B). As it appears that there was a Late Pottery Neolithic (Wadi Rabah) occupation at Beisamun (Rosenberg et al. 2006), and our bowl was found out of context, it is suggested that this bowl be attributed to the Wadi Rabah horizon at Beisamun.

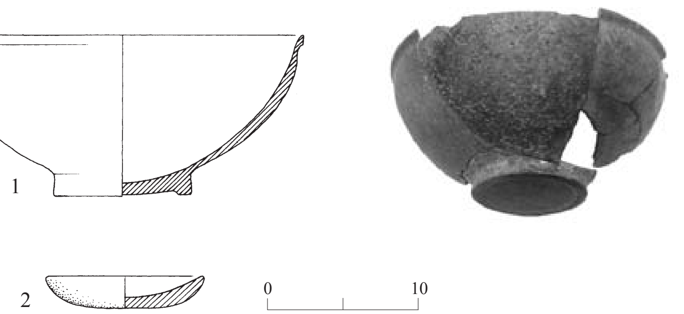

Fig. 28. Stone vessels.

No.	Type	Area	Square	Basket	Description
1	Hemispherical bowl with ring base	A	X13	1083	Undetermined type of stone, burnt
2	Platter	A	X10	1056	Limestone

The fine hemispherical bowl in Fig. 28:1 has an everted rim and a ring base. Although the type of stone from which it was made cannot be determined, it was certainly burnt and found near the burial in L105. No parallels were found in the southern Levant, although similar stone bowls are noted in the northern Levant, for example at Tell Sabi Abyad in the Balikh Valley, where a similar, delicate bowl made of gypsum was found in Level 6, dated to the Early Halafian period, c. 6100–5900 BCE (Collet and Spoor 1996:422, Fig. 7.6:4). Another similar example, although thicker and made of basalt, was recovered from Stratum 6C of the earlier excavations at the same site, and also dated to this period (Akkermans 1989:286, Fig. VIII.2:5). Bases were not preserved in either case. Bowls with similar rims and body profiles, but with round bases, made of alabaster and steatite, originate in Level II at Tell Ramad, near Damascus, where they are dated to the Late PPNB, c. 7500–7000 BCE (de Contenson 2000:114, Fig. 93:15, Table 9). Stone bowls with disc and ring bases are recorded from two sites, as far as we know. At Tell Judaidah, a stone bowl with a large disc base (Braidwood and Braidwood 1960: Fig. 32:5) was dated to the Final PPNB/Early Pottery Neolithic (c. 6800–6500 BCE, Amuq Phase A). In Phase 1b at Tell Umm Qseir by the Khabur River (Tsuneki 1998:109, Fig. 47:3), a disc base of a gypsum bowl was dated to the Middle Halafian period (c. 5500–5200 BCE; Miyake 1998). Unfortunately, the rims of these bowls were not preserved.

Platter.— This very shallow bowl (Fig. 28:2) is made of limestone, and is well-polished by abrasion. The only parallels from the southern Levant are a similar vessel made of chlorite found in a Wadi Rabah context (Level IV) at Ha-Gosherim, which apparently originated in Syria (Rosenberg, Getzov and Assaf 2010:286–287, Fig. 8:D), and another from Byblos (unknown material; Dunand 1973: Fig. 55:23193; Rowan 1998: Fig. 15D). The PN platters from Munḥata (Gopher and Orelle 1995: Type A1) are larger and not well-finished.

Handle.— One small lug handle was recovered, and it is unknown to what vessel it was attached.

Figurine or Weapon?

The X-shaped object in Fig. 29 was carved from a limestone nodule leaving four protruding 'wings', then pecked into its final shape. Two of the protrusions are more rounded, resembling animal heads (a two-headed animal?). Another alternative is that the object was attached to a cord and utilized as a kind of throwing device, designed to hunt animals by entangling their legs or wings in the cords.

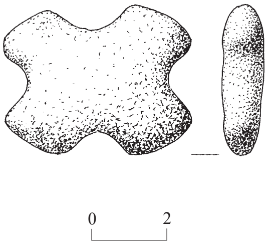

Fig. 29. Figurine or weapon, limestone, Area A, Sq X11.

Discussion

Most of the groundstone tools from Areas A and B were used in pounding, grinding, abrading or rubbing activities, and there are indications that mortars were also used for pounding. The ratio of grinding stones to mortars is c. 2:1. Hammerstones could be related to the on-site production of flint tools.

Two tools exhibit ochre on their working surfaces, probably indicating they were used to produce pigment. Worth noting are the limestone and chalk flaked tools, as well as the few, but important, debitage items of basalt and limestone, which may indicate on-site manufacturing of stone tools.

Vessels are a relatively significant part of the groundstone assemblage (c. 9% of the total items), comprising types known from Neolithic sites in the southern Levant. The inter-site distribution of the stone tools and vessels (Table 5) reveals that the main activities related to groundstone objects took place in Area A. Nonetheless, also in Area B grinding and food-preparation activities were conducted, as a concentration of five tools and vessels was observed in Sq X16 (e.g., Figs. 26:2; 27:2).

The raw materials are mostly local, with a prevalence of non-vesicular basalt. Some of the limestone items are burnt, as is the bowl in Fig. 28:1, retrieved near the burial in L105 Area A (see Plan 1). It is unclear if this was a deliberate treatment or the result of fire activities at the site, although in the burial in L105, cremation was identified. The pedestal bowl in Fig. 27:3 was plastered, probably the result of the rejuvenation of an important vessel.

The hemispherical bowl in Fig. 28:1 and the platter in Fig. 28:2 were probably imported from the northern Levant, indicating some form of long-distance exchange relations with sites/ cultures to the north (Milevski and Barzilai, forthcoming).

FAUNAL REMAINS

From the Pottery Neolithic Layer II in Areas A and B, 781 mammalian bones were identified.

Methods

Recovery and Cleaning.— The assemblage was recovered by dry sieving through a 10 mm mesh. The bones were subsequently cleaned in the archaeozoology laboratory at the University of Haifa using running water and a brush to remove caked mud; after drying they were re-packed in their original paper bags.

Bone Identification and Counting Procedures.— Mammalian bones were identified using the comparative collection of the archaeozoology laboratory at the University of Haifa, and each specimen that could be attributed with certainty to a biological taxon was recorded. The morphologically similar caprovine taxa (sheep and goats) were identified to genus whenever possible using the criteria proposed by Boessneck (1969). Deer bones were identified to genus following Lister (1996). Each identified bone was assigned a percentage of completeness for each of the zones present in the specimen. Long bones were divided into five zones: proximal epiphysis, proximal, medial and distal diaphyses, and distal epiphysis. Other elements were divided into zones following Dobney and Rielly (1988), exempting carpal and tarsal bones, which were treated as having a single zone.

Minimum number of elements (MNE) values for the different elements and parts thereof were calculated by summing the percentages of each zone for each element (e.g., Klein and Cruz-Uribe 1984). In order to facilitate comprehension of the results, some zones (long-bone shafts, the pelvis) were merged with other zones of the same element, and the resulting MNE counts are those of the most frequently appearing zones of the ones that were merged. The MNE count for each element was divided by the number of times the element should appear in a complete skeleton to derive the minimum number of animal units (MAU). The highest MAU value for each taxon is the minimum number of individuals (MNI) for that taxon. Number of identified specimens (NISP) for each element is also provided.

Measurements.— Specimens were measured whenever possible using digital vernier calipers. Measurements were taken following von den Driesch (1976) and Davis (1985).

Identification of Bone Surface Modifications.— Bone surface modifications (BSM) were sought regularly, as they provide useful information pertaining to the pre- and post-depositional processes that affected the assemblages. The following types of BSM were recorded (cut marks coded according to Binford 1981:136–142):

Burning damage: recorded as scorched (1), carbonized (2), or calcined (3);

Carnivore gnawing: recorded only when gross damage was apparent (Binford 1981:44–47);

Sub-aerial weathering: recorded following Behrensmeyer's (1978) protocol;

Root-etching: noted as present or absent on shaft fragments longer than 4 cm (when weathering could also be observed);

Fracture morphology: the frequency of 'green' fractures, inflicted when the bone was fresh, was calculated following Villa and Mahieu (1991).

Age and Sex Determination.— Age at death was determined using counts of fused and unfused epiphyses of skeletal elements that ossify at known ages (Silver 1969), as well as the state of teeth wear for caprovines (Payne 1973) and suids (Grant 1982); the negligible number of cattle teeth prohibited the use of this technique for these bovids. Sample sizes were too small to determine sex ratios even for the better-represented taxa in the assemblage.

Determination of State of Domestication.— The small sample sizes dictated the use of the log-size index (LSI) technique (e.g., Meadow 1989) to gain an estimate of the body sizes of potentially domestic taxa (cattle and pigs) in relation to a wild standard. Consistently low LSI values for archaeological specimens suggest a domesticated status manifested in a reduction in body size. The LSI for each element is calculated as: LSI = Log (reference)–Log (mean of archeological specimens).

The reference animal, in the case of cattle, is a *Bos primigenius* female from Denmark (measurements in Grigson 1989), and in the case of suids, a wild boar female from Anatolia (Hongo and Meadow 1998). When several measurements of specimens were available in the assemblage for each element, the logarithm of their arithmetic mean was used. Logarithms were calculated to a base of ten.

Results

Frequency of Taxa.— A total of 781 mammalian bones were identified in the assemblage from a total of 5657 bone fragments. These represent a minimum of 28 individuals (Table 7).

Sheep (*Ovis aries*) and goats (*Capra* cf. *hircus*) are the best-represented taxa in the assemblage (NISP = 235; 30%). The ratio of sheep to goats may be inferred from the small number of caprovine bones identified to genus (N = 39) as 1.78:1. Cattle (*Bos* cf. *taurus*) is the second most abundant taxon (NISP = 177; 23%), followed closely by pigs (*Sus scrofa*; NISP = 157; 20%). Gazelles (*Gazella* cf. *gazelle*; NISP = 127; 16%), fallow deer (*Dama mesopotamica*; NISP = 3) and red deer (*Cervus elaphus*; NISP = 3) are game taxa that were probably not very abundant in the immediate vicinity of the site due to their habitat preferences (open terrain for gazelles,

Table 7. Taxonomic Frequencies

Order	Taxon	NISP	MNI	% NISP
Ungulata	*Caprovines*	196	6	25
	Capra hircus	14	2	2
	Ovis aries	25	2	3
	Bos taurus	177	2	23
	Sus scrofa	157	4	20
	Gazella cf. gazella	127	4	16
	Deer	11	1	1
	Dama mesopotamica	3	1	0
	Cervus elaphus	3	1	0
Lagomorpha	*Lepus capensis*	1	1	0
Carnivora	*Canis* sp.	22	1	3
	Vulpes vulpes	2	1	0
	Felis sp.	2	1	0
	Meles sp.	1	1	0
Total		741	28	100

forest for deer). Smaller game taxa like hare (*Lepus capensis*; NISP = 1), fox (*Vulpes vulpes*; NISP = 2), wild felid (*Felis* sp.; NISP = 2) and badger (*Meles* sp.; NISP = 1), are represented in very low frequencies. A large canine (*Canis* sp.), probably domestic dog, appears in a relatively high frequency (NISP = 22; 3%).

A single distal humerus of a duck-sized bird was found. No remains of fish were discovered. Numerous fragments of freshwater shells were also recovered and separated for future malacological examination.

Age at Death.— An analysis of the culling pattern was undertaken for the caprovine, cattle and pig populations exploited at the site.

Caprovines: The absolute frequencies of fused and unfused elements for the caprovines in the assemblage, and the fusion age of the various elements (Silver 1969), are presented in Table 8, and the mortality curve constructed from this data appears in Fig. 30. It is apparent that most of the caprovines did not survive to mature adulthood. A similar picture emerges from an analysis of teeth-wear patterns (Table 9).

Table 8. Epiphyseal Fusion Data for Sheep and Goats

Bone	Fusion Age	Fused	Unfused
Young			
Metapod, p.	0	3	0
Scapula	6–8	8	3
Phalanx	6–16	8	1
Radius, p.	10	6	0
Humerus, d.	10	3	0
Total		*28*	*4*
Young Adult			
Tibia, d.	18–24	3	0
Metapod, d.	18–24	9	5
Total		*12*	*5*
Mature Adult			
Acetabullum	36	4	2
Radius, d.	36	2	3
Tibia, p.	36–42	3	0
Femur, p.	36–42	3	0
Femur, d.	36–42	0	2
Humerus, p.	36–42	0	0
Total adult		*12*	*7*
Ulna	42–48	0	0
Vertebrae	48–60	2	6
Total		*2*	*6*
Total		*108*	*44*

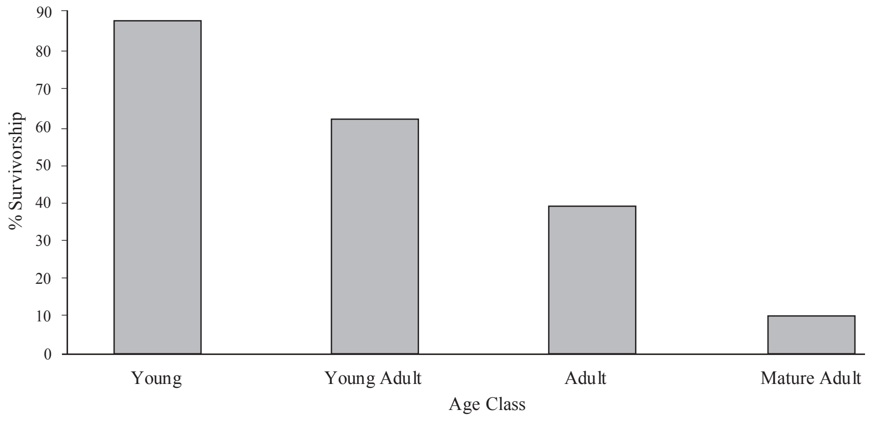

Fig. 30. Mortality of caprovines based on epiphyseal fusion data (data from Table 8).

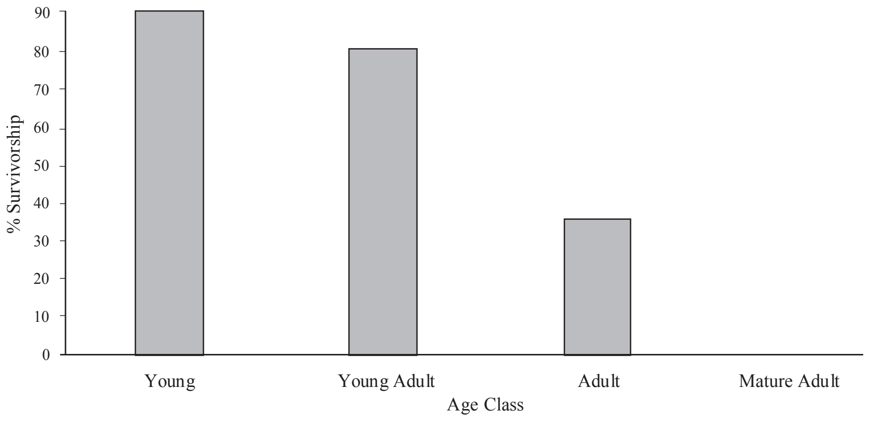

Fig. 31. Mortality of cattle based on epiphyseal fusion data (data from Table 10).

Fig. 32. Mortality of pigs based on epiphyseal fusion data (data from Table 11).

Table 9. Tooth-Wear Stage Frequencies for Sheep and Goats

Tooth-Wear Stage	Age in Months	Frequency
a–c	0–12	6
d	13–24	2
e	25–36	5
f	37–48	3
g+	48+	4
Total		*20*

Table 10. Epiphyseal Fusion Data for Cattle

Element	Fusion Age	Fused	Unfused
Young			
Metapod, p.	0	4	0
Acetabulum	6–10	5	1
Scapula	7–10	1	0
Total		*10*	*1*
Young Adult			
Radius, p.	12–18		
Humerus, d.	12–18	0	1
Phalanx	18–24	31	3
Total		*31*	*4*
Adult			
Tibia, d.	24–30	3	3
Metapod, d.	24–36	5	1
Calcaneus	36–42		
Femur, p.	42	1	1
Femur, d.	42–48	0	2
Tibia, p.	42–48	0	1
Humerus, p.	42–48	0	1
Radius, d.	42–48	0	2
Ulna	42–48		
Total		*9*	*11*
Mature Adult			
Vertebrae	84–108	0	5
Total		*0*	*5*
Total		*50*	*21*

Cattle: The epiphyseal fusion data for cattle suggest that less than 50% of the herd survived into adulthood (Table 10; Fig. 31). This conclusion cannot be corroborated by teeth-wear data due to sample-size limitations.

Table 11. Epiphyseal Fusion Data for Suids

Element	Fusion Age	Fused	Unfused
Young			
Acetabulum	12	1	2
Scapula	12	10	1
Radius, p.	12	4	2
Humerus, d.	12	2	4
Total		*17*	*9*
Adult			
Calcaneus	24–36	1	6
Ulna	36	0	2
Total		*1*	*8*
Total		*18*	*17*

Table 12. Tooth-Wear Stage Frequencies for Suids

Tooth-Wear Stage	Age in Months	Frequency
a–c	0–12	5
d	13–24	2
e	25–38	1
f	37–48	1
Total		*9*

Pigs: Both the epiphyseal fusion data (Table 11) and the tooth-wear data (Table 12) indicate the exceedingly young age of the pig sample. The survivorship chart in Fig. 32 shows that the majority of the herd did not survive into the second year of life, and few animals survived to adulthood.

Body Sizes of Cattle and Pigs.— The LSI-based body-size comparison was undertaken to determine the state of domestication of the cattle and pigs at the site. The analysis reveals that both the cattle (Table 13; Fig. 33) and the pigs (Table 14; Fig. 34) were smaller than the reference populations. Special note is due to the low LSI value of the complete cattle mandibular M3 from Beisamun, as teeth measurements

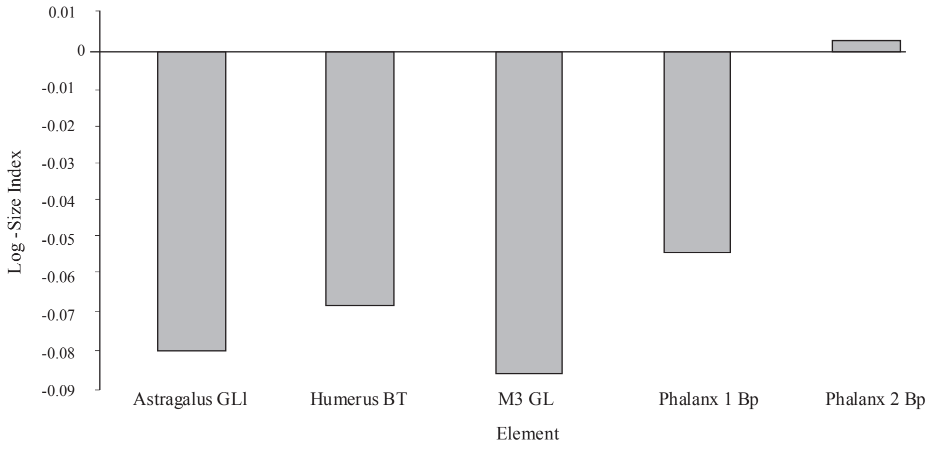

Fig. 33. The LSI differences between measurements of the cattle and the reference specimen (data from Table 13).

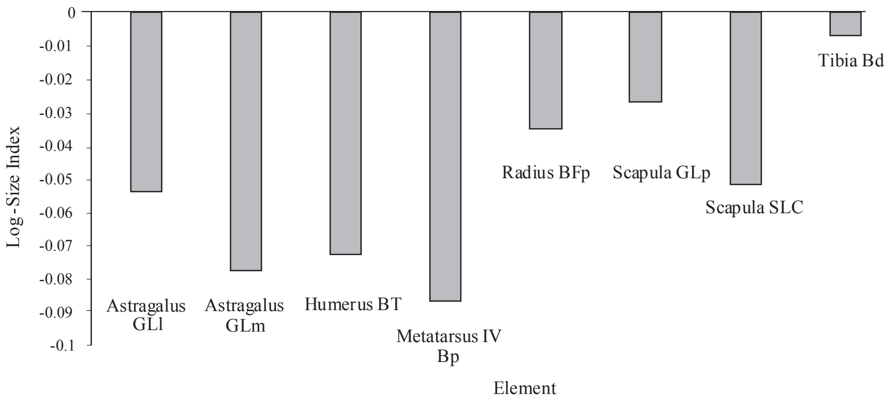

Fig. 34. The LSI differences between measurements of the suids and the reference specimen (data from Table 14).

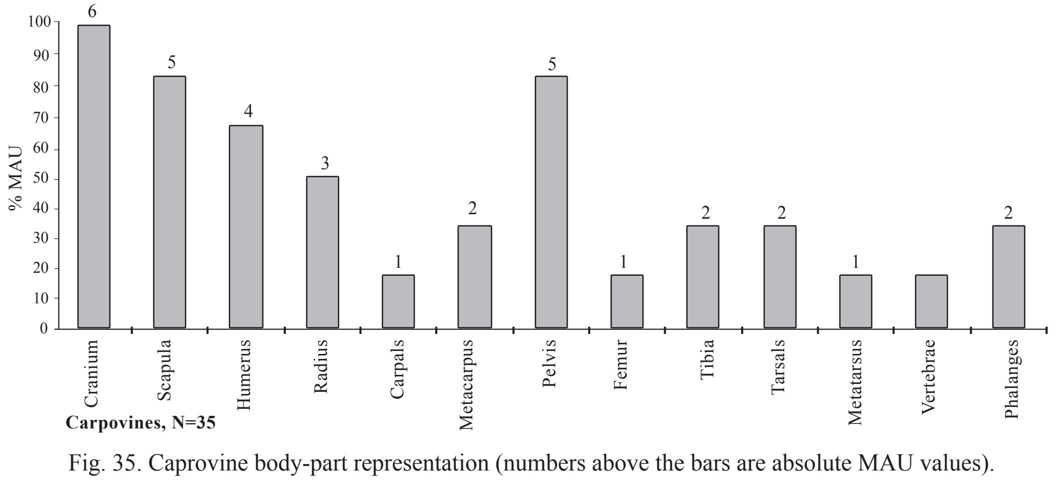

Fig. 35. Caprovine body-part representation (numbers above the bars are absolute MAU values).

Table 13. Log-Size Index (LSI) for Cattle at Beisamun (the reference specimen is the wild-cattle individuals in Grigson 1989)

	Beisamun Average	N	Reference	LSI
Astragalus GLl	69.1	1	83	-0.079
Humerus BT	76.2	1	89	-0.067
M3 GL	40.1	1	48.8	-0.085
Phalanx 1 Bp	34.5	10	39	-0.053
Phalanx 2 Bp	36.3	10	36	0.003

Table 14. Log-Size Index (LSI) for Suids at Beisamun (the reference specimen is the wild individuals in Hongo and Meadow 1998)

	Beisamun Average	N	Reference	LSI
Astragalus GLl	41.9	3	47.5	-0.054
Astragalus GLm	36.4	3	43.6	-0.078
Humerus BT	29.2	1	34.6	-0.073
Metatarsus IV Bp	14.3	1	17.5	-0.087
Radius BFp	31.5	3	34.2	-0.035
Scapula GLp	37	5	39.4	-0.027
Scapula SLC	23.5	6	26.5	-0.052
Tibia Bd	32.9	4	33.5	-0.007

are generally not sexually dimorphic and their diminution following domestication is slower than that of post-cranial elements.

Skeletal-Element Abundance (SEA) Profiles.— The relative proportion of the various skeleton elements appearing in the assemblage may allow a reconstruction of prey-transport behaviors, consumption practices and post-depositional attrition (e.g., Binford and Bertram 1977; Binford 1981; Lyman 1987; 1994; Zeder 1991). An analysis of the body-part representation of caprovines (Fig. 35), cattle (Fig. 36), pig (Fig. 37) and gazelle (Fig. 38) has been attempted, the other taxa being too rare.

The SEA profiles tend to show a higher frequency of representation for the lower limbs, especially the hind limbs, and a lower frequency of elements originating in the meaty upper parts of the limbs. No category of skeletal elements seems conspicuously absent in any of the taxa. A correlation between food utility index (FUI) values (Metcalfe and Jones 1988), and frequency of representation of the various elements in sheep and goats (Fig. 39), fails to support covariance of these two values in caprovines (Spearman's $R = 0.16$, $P = 0.53$, for which MNE values were deemed sufficiently high to serve as an ample sample). Caprovine SEA profiles do not represent the effects of density-mediated attrition (Fig. 40; Spearman's $R = 0.05$, $P = 0.82$). Thus, it is reasonable to assume that the SEA profiles do not reflect true properties of the population, due to the small sample sizes.

Bone Surface Modifications.— The relative and absolute frequencies of the various BSM types appear in Table 15. Cut marks were rarely discovered, probably due to the calcareous

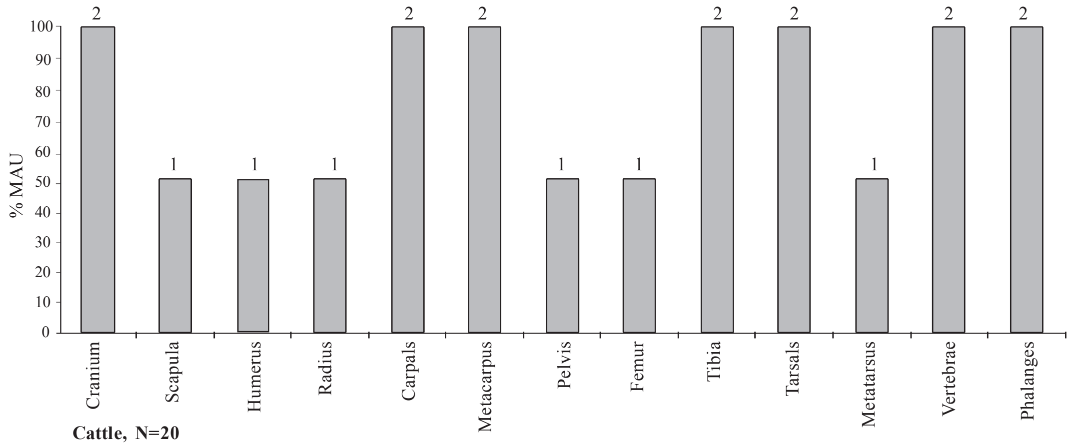

Fig. 36. Cattle body-part representation (numbers above the bars are absolute MAU values).

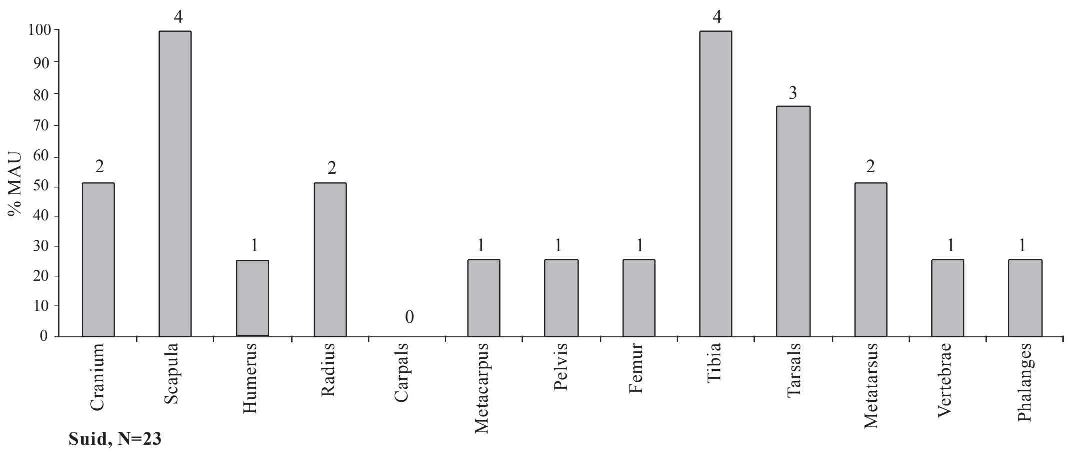

Fig. 37. Pig body-part representation (numbers above the bars are absolute MAU values).

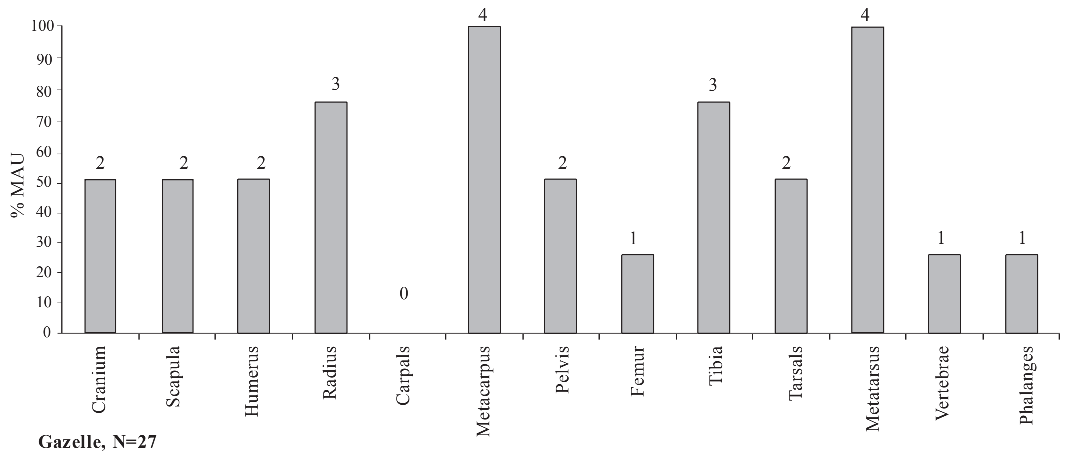

Fig. 38. Gazelle body-part representation (numbers above the bars are absolute MAU values).

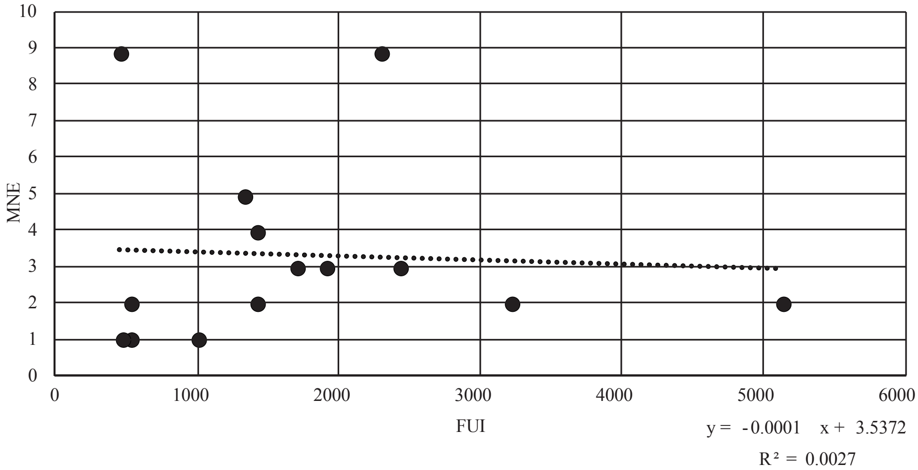

Fig. 39. Bone food-utility index (FUI) values for sheep (Metcalfe and Jones 1988) plotted against skeletal element representation for caprovines in MNE (Spearman's R = -0.16, P = 0.53).

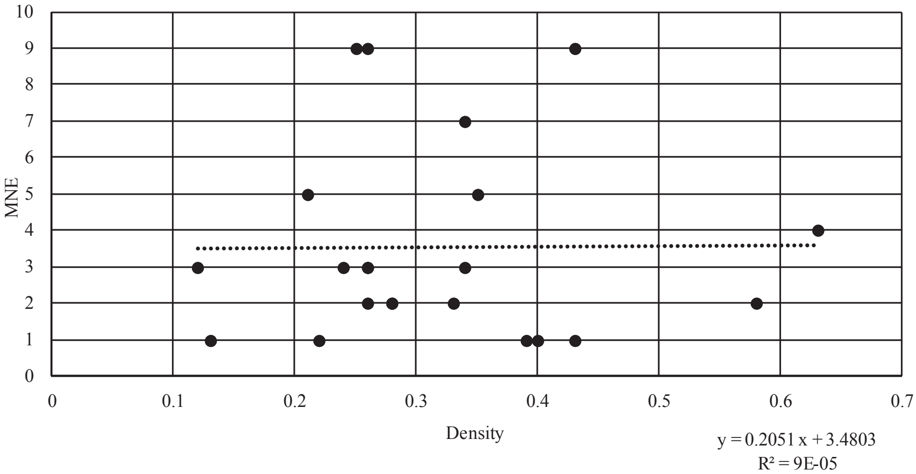

Fig. 40. Bone photo-densitometry values (Lyman 1984) plotted against skeletal element representation of caprovine elements (Spearman's R = -0.05, P = 0.82).

rind adhering to most of the bones. The few butchery marks detected are mostly the result of dismemberment activities (12 of 14; Table 16). Burnt bones (carbonized or calcined), mostly due to exposure to direct fire, are ubiquitous in the assemblage (n = 128; 16% of the identified bones). The rate of gross carnivore damage is also relatively high (n = 52; 7%), perhaps partly due to cohabitation with domestic dogs.

Subaerial weathering refers to damage caused by exposure to sun and wind, as well as to temperature and humidity changes in post-depositional, pre-burial contexts. The rate of weathering was recorded for a sample of 106 caprovine shaft fragments longer than 4 cm, the surface of which was clean of breccias. Most (n = 99) showed mild weathering (Behrensmeyer 1978: Stage 2), manifested by small cracks and exfoliation of the bones' outer cortex, suggesting a relatively quick post-depositional burial of the faunal remains. This conclusion is strengthened somewhat by the low number of root-etched bones (the same sample that was checked for weathering), assuming that most root etching takes place near the surface, in the higher parts of the humus.

Table 15. Bone-Surface Modifications Observed on the Specimens

Modifications		N	% NISP
Cut marks		14	2
Burned		128	16
	Scorched	31	4
	Carbonized	50	6
	Calcined	47	6
Carnivore gnawing		52	7
Weathering	Stage 2	99	13
	Stage 3	7	1
Root etching	Yes	6	1
	No	75	10

The fracture morphology data presented here (Table 17; Fig. 41) refer to a sample of caprovine bones that retained either a diaphyseal fragment attached to the epiphyses or a discrete piece of shaft, the orientation of which could be discerned. In any case, the morphological description pertains to the part of the shaft closest to the diaphyseal center. In the fracture angle and fracture edge categories, a majority of 'green' fractures, made on fresh bone, is indicated (14 to 7 and 16 to 7, respectively). Fracture edges were usually jagged (22 to 5), indicating breakage of dry bones. This criterion, however, is of dubious value in this case, as the calcareous rind that adhered to most of the bones tended to lend fracture edges a ragged appearance. The large percentage of shaft fragments that retained over half of the original circumference may be indicative of carnivore ravaging of the assemblage, attributable to (and in line with) the high frequencies of canid bones and gross carnivore damage in the assemblage.

Summary and Conclusions

The assemblage, comprising a sample from the Pottery Neolithic layer at Beisamun

Table 16. List of Butchery Marks Observed on Bone Specimens (N = 14) (cut-mark codes refer to Binford 1978)

Taxon	Element	Fused/Unfused	Cut-Mark Code	Butchery Stage
Bos	Carpal		C-1	Dismemberment
	Innominate		PS-8	Dismemberment
	Vertebra	Unfused	cleft	Dismemberment
c/o	Femur		Fp-4	Filleting
	Humerus	Unfused	Hd-3	Dismemberment
Ovis	Humerus	Fused	Hd-2	Dismemberment
Gazella	Innominate	Fused	PS-8	Dismemberment
	Metacarpus	Fused	MCp-1	Dismemberment
	Metapodial	Fused	MTd-2	Skinning
	Metatarsus		MTp-1	Dismemberment
	Radius	Fused	RCd-4	Dismemberment
Sus	Humerus	Unfused	Hd-4	Dismemberment
	Tarsal		TNC-1	Dismemberment
	Tibia	Unfused	Td-1	Dismemberment

(n = 781) is dominated by caprovines (30%), cattle (23%), pigs (20%) and gazelles (16%), with a lesser presence of deer and small carnivores, including a large canid (3%), assumed to be a domesticated dog. The composition of wild game taxa indicates foraging bouts to neighboring areas where gazelle and deer were found, probably on the edge of the Galilee Hills.

Mortality profiles for caprovine herds show intense culling among the young adults of the herd—presumably the extra males not needed for breeding. Keeping a surplus of males into their second year indicates the herders' attempt to maintain herd security by protecting the necessary male breeding stock against unexpected mortality due to disease or other calamites, a pattern familiar among many ethnographic herd keepers (Redding 1981:33). This is in opposition to a strategy meant to optimize meat production, in which most culling takes place during the first year, as the animals attain the optimal weight beyond which feeding them is not economical (Payne 1973). The ratio of sheep to goats (1.78:1) is also in line with the proposed attempt to optimize herd security, as sheep yield more meat and milk, while goats are hardier and are used as an insurance against species-specific maladies that may affect the less-resilient sheep (Redding 1981:132). The high ratio of sheep to goats is a phenomenon that first appears in the transition from the PPNB to the PPNC, for example at 'Ein Ghazal (Wasse 2002) and Ha-Gosherim (Haber 2001).

Table 17. Fracture Morphology Observed on Caprovine Bones

Category	Character	N	%
Fracture angle	Oblique	14	40
	Right	7	20
	Oblique and right	14	40
Total		*35*	*100*
Fracture edge	Jagged	22	67
	Smooth	5	15
	Intermediate	6	18
Total		*33*	*100*
Fracture outline	Transverse	7	20
	Curved	12	34
	V-shaped	4	11
	Intermediate	12	34
Total		*35*	*100*
Shaft circumference	Complete	18	42
	>0.5	5	12
	<0.5	20	47
Total		*43*	*100*

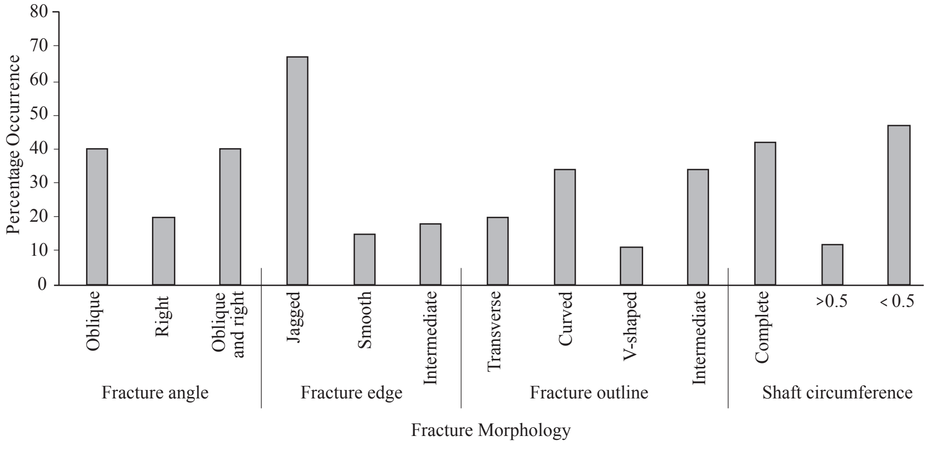

Fig. 41. The distribution of the characteristics of the fracture morphology (data from Table 17).

The young culling age of both cattle and pigs, with the support of the metrical analysis indicating small body size, suggests that both these taxa were already domesticated. This is not surprising for the cattle (Grigson 1989; Helmer et al. 2005; Horwitz and Ducos 2005); however, morphological diminution of pigs was assumed to have commenced no earlier than the Wadi Rabah phase of the local Pottery Neolithic period (Haber and Dayan 2004; Haber, Dayan and Getzov 2005; Davis 2012:1258–1320). It is suggested, however, to treat these findings with caution, as the sample size is small. In addition, some doubts have been raised regarding the utility of culling patterns to detect domestication in pigs (Redding 2005).

The taphonomic history of the assemblage suggests that the bones were subjected to intense human processing activities, mostly carcass processing (evidenced by the butchery marks) and roasting (high percentage of burnt bones). The high rate of carnivore gnawing, probably by dogs, is another taphonomic effect in this assemblage, also manifested in the high frequency of shaft fragments that retain most of their epiphyseal diameter. Based on these data, it may be suggested that the frequent 'green' fractures were partly caused by breakage of relatively fresh bones by domestic dogs. The SEA profiles show universally low rates of preservation of the upper limbs, probably due to intense processing of these nutrient-rich parts of ungulate carcasses. Low weathering stages indicate that most bones were buried quickly, and subaerial weathering was probably not a major taphonomic actor at the site.

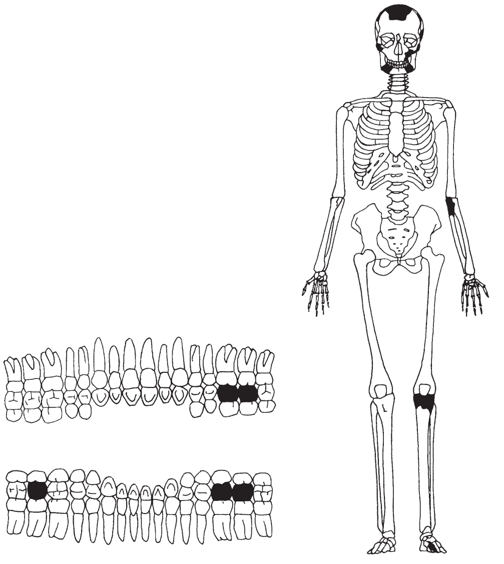

Fig. 42. Preserved bones from Burial 105 in Area A.

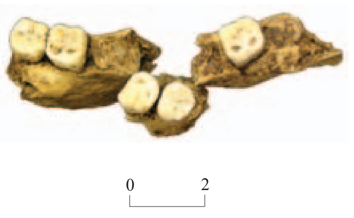

Fig. 43. Human teeth exhibiting 'cupping' on the occlusal surface of the molars.

HUMAN REMAINS

Only one secondary burial (L105) was revealed in the excavations, containing the remains of an adult female, over 40 years of age, found next to W7 in Area A (see Plan 1). The bones were concentrated in a patch around a delicate stone bowl (Fig. 28:1), together with a few animal bones. Both the human and animal bones were extremely fragmentary and burnt, possibly as a result of cremation.

The bones included fragments of the left ulna, the left tibia and the 4th metatarsal of the left foot. Most of the skull was crushed, but parts of the mandible were preserved (Fig. 42). The surviving teeth were well-worn, as evident from the cupping of the enamel on the occlusal surfaces of the molars (Fig. 43).

DISCUSSION AND CONCLUSIONS

Despite the fact that the excavation area was located along the western fringes of the site, the building remains and artifacts were well-preserved. The settlement apparently extended eastward over an area of c. 40 dunams. Area C, a test square that was excavated c. 40 m east of Areas A and B, revealed thicker archaeological layers and exposed an additional occupation attributed to the PPNB (Layer IIIC), below the PN occupation (Layer II). The most characteristic feature of the PN settlement is the homogeneity of the material culture, which enables dating the occupation in the lower level of Layer II to the early stages of the PN period.

Despite the salvage nature of the excavation, architectural remains were revealed in most of the excavated squares. However, due to the limited exposure we could not determine the site organization, although partial reconstruction of structures was possible in Area A. It seems that most of the buildings were rectilinear in plan and at least one complex displayed a well-organized structure with two rooms around an open space, perhaps a courtyard, with associated circular stone installations and hearths.

The construction techniques were characterized by thick stone foundations, usually of one or two rows of large fieldstones with a core of small, round stones. All the foundations were preserved to a height of two to four courses. Superstructures were possibly of mud brick.

The architectural plans, comprising single rooms and complexes, as well as pits, are comparable to other Early PN sites in the Ḥula Basin, such as Tel Te'o Strata XII–XI (Eisenberg, Gopher and Greenberg 2001:16–17) and Tel Ro'im West Layer III (Nadler-Uziel 2007; Nadel and Nadler-Uziel 2011:4), as well as Sha'ar Ha-Golan in the Jordan Valley (Garfinkel and Miller 2002:17).

The material culture consists of homogenous flint and stone assemblages and poorly preserved potsherds, which date the site to the Early PN period, along with a wide range of animal bones.

The formal flint tools include hallmarks of the Early PN flint assemblages in the southern Levant, such as sickle blades with deep denticulation (Type A), distinct, elongated, leaf-shaped Amuq arrowheads with tangs fashioned by collateral pressure retouch (Type A-6), and many axes, some with a polished cutting edge, others shaped by the Ḥula break technique.

In general, similar frequencies of arrowheads, sickle blades and bifacial tools are seen in other Early PN assemblages of the southern Levant, such as the Yarmukian assemblages of Sha'ar Ha-Golan (Stekelis 1966; Garfinkel 1992; 1993; Garfinkel and Miller 2002), Munḥata Layer 3 (Perrot 1972; Gopher 1989), 'Ein Ghazal (Rollefson and Simmons 1986; Rollefson 1993; 1998), Tel Te'o Strata XII–XI (Eisenberg, Gopher and Greenberg 2001) and Jericho (Crowfoot-Payne 1983). However, comparison of the Early PN flint assemblage from Beisamun West with flint assemblages from contemporary sites in the Ḥula Basin attests to the existence of a local PN lithic tradition that has much in common with the Yarmukian culture, but distinct flint-tool frequency characteristics. These include the high percentage of bifacial tools, the common use of pressure retouch, the distinctive break defined as the Ḥula break, and the absence of small arrowheads that appear in low quantities elsewhere in Yarmukian assemblages and became the dominant type in the Jericho IX/Lodian assemblages (Gopher 1993; 1994; Gopher and Blockman 2004; Khalaily 2006).

On the other hand, there is a striking similarity between this lithic tradition and that of the PPNC at Ha-Gosherim (Khalaily 2006:306), not only in the reduction sequences, but also in the tool-shaping method. No technological changes occurred during the transition from the PPNC to the Early PN at Ha-Gosherim, nor are there any fundamental differences in the tool classes. These observations indicate that the same lithic traditions continued from the PPNC into the Early PN, and therefore, they should be grouped together in one techno-typological complex at the beginning of the Early PN, preceding the Yarmukian culture. There may be a certain chronological overlap between the two cultures, or it is possible that during this pre-Yarmukian period, pottery manufacture developed more rapidly in some places than in others.

The nature of the pottery finds suggests that pottery was produced somewhere at the site. The excavation yielded a few vessel types that can be attributed with a high degree of certainty to the Early PN repertoire, resembling Yarmukian types. The absence of the typical decoration can be explained, as mentioned above, by either the regional culture of the Ḥula Basin, or the limited sample and the fact that only a small portion of the site was excavated.

More than half of the stone tools and vessels recovered at the site were made of basalt, while 40% were made of limestone or chalk. The few, but important, debitage items of basalt and limestone could indicate on-site stone-tool manufacturing. Their distribution indicates that most preparation and maintenance of the groundstone items, as well as grinding and pounding activities, were carried out in Area A, while some grinding work also took place in Area B, perhaps hinting at a division of production and storage activities at the site. The stone vessels, an important element of the assemblage, are known types in the Early PN period of the southern Levant.

The faunal assemblage from this excavation is dominated by fully domesticated caprovines, cattle and pigs. The predominance of domesticated animals and the high ratio of sheep among the caprovines, support the attribution of this faunal assemblage to the Early PN period of the southern Levant.

In conclusion, the salvage excavation at Beisamun West revealed important data related to the PN occupation at the site, and its relationship to other sites with a comparable material culture in the Ḥula Basin. The building remains, as well as the flint, pottery and stone assemblages and a single radiocarbon date of 6450–6220 BCE (cal.),[2] enable us to attribute the Layer II occupation on the western fringe of the site to a local cultural entity dated to the earliest stages of the PN period in the southern Levant, during the second half of the seventh millennium BCE, preceding the Yarmukian culture.

NOTES

[1] The excavation (Permit No. A-5107), undertaken on behalf of the Israel Antiquities Authority and underwritten by the Department of Public Works, was directed by Hamoudi Khalaily, with the assistance of Omri Barzilai, Eno Bron and Gilead Yaffe (area supervision), Yossi Ya‘aqobi (administration), Avi Hajian (surveying), Elizabeth Belashov (drafting), Michael Smilanski (flint drawing), Leonid Zeiger (stone vessel drawing), Anastasia Shapiro (GPS) and Dina Avshalom-Gorni and Nadia Bornstein. Special thanks are due to the editor of this article; it would not have been published without her endless patience.

In this publication, Demitry Yugorov and Hamoudi Khalaily contributed the report on the lithic finds, Hamoudi Khailaly, the pottery, Ianir Milevski, the groundstone tools, Nimrod Marom, the fauna and Tali Kuperman, the human remains.

[2] The radiocarbon date was analyzed by Elisabetta Boaretto. The authors wish to thank her.

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