Neolithic Flint Workshops at Giv'at Rabi (East) in Lower Galilee

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Introduction

During February–March 2008, a salvage excavation was conducted at Giv'at Rabi (East) in Lower Galilee (map ref. NIG 226143–995/736634–7231, OIG 176143–995/236634–7231), c. 3 km north of Kefar Ha-Ḥoresh and 5 km east of Yiftaḥ'el (Fig. 1).[1] The excavation revealed Middle Palaeolithic (Mousterian; see Ekshtein et al. 2011) and Neolithic flint-workshop dumps on top of Eocene flint outcrops. This article presents the flint assemblages from the Neolithic workshops that produced bidirectional blades, unidirectional blades and bifacial tools.

The Neolithic blades from Giv'at Rabi (East) were produced from wide cores with relatively few preparations. The bifacial tools included unfinished and finished cortical axes and adzes. These techno-typological characteristics suggest that the workshops at Giv'at Rabi (East) should be dated to the Final Pre-Pottery Neolithic (PPNB) and the Early Pottery Neolithic (PN) periods.

The discovery of the Neolithic workshops at Giv'at Rabi (East) contributes to our understanding of the organization of the lithic industries in the region of Lower Galilee during the periods under discussion. The location of these workshops above flint outcrops in the

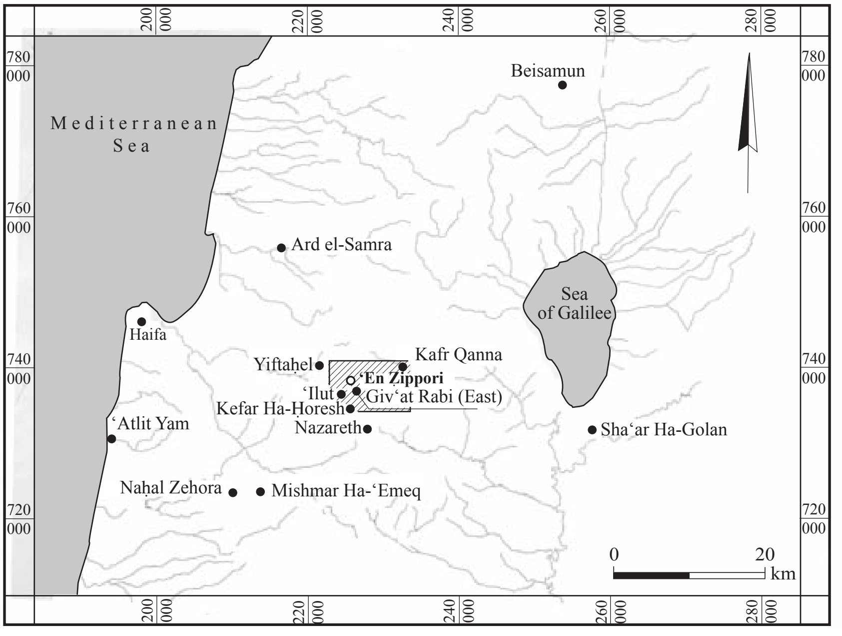

Fig. 1. Map of the Galilee showing the location of Giv'at Rabi (East) and other Neolithic sites.

vicinity of the large permanent settlement of ‘En Ẓippori (Barzilai 2010a) suggests this may have been a designated ‘industrial area’ for flint production. A similar pattern is known at the PPNB sites of Yiftaḥ’el (Oshri et al. 1999; Garfinkel 2007; Khalaily et al. 2008) and ‘Ein Ghazal (Quintero 1996; 2010), where local flint outcrops were exploited for the formal flint technologies. The excavation results from Giv‘at Rabi (East), and recent technological studies of bifacial and blade workshops from neighboring sites in Lower Galilee (Barkai 2005; Barzilai 2010b), attest to the importance of these formal technologies during the Neolithic period.

The Pre-Pottery Neolithic B Period in Lower Galilee

In Lower Galilee, the Neolithic period has been investigated since the 1980s. Extensive excavation projects at Yiftaḥ’el (Garfinkel 1987; Khalaily et al. 2008; Garfinkel et al. 2012), Kefar Ha-Ḥoresh (Goring-Morris et al. 1995; 2008), Naḥal Ẓippori (Barzilai et al. 2013) and ‘En Ẓippori (Getzov et al. 2011), small-scale excavations at Kafr Qanna (Howard Smithline, pers. comm.), ‘En Ẓippori (Barzilai 2010a) and Giv‘at Rabi (East) (Barzilai and Milevski 2010), and archaeological surveys along Road 79, have revealed that the Lower Galilee (Oshri et al. 1999; Khalaily and Marder 2009) was intensively occupied during the PPNB (Fig. 1).

The PPNB settlement pattern in Lower Galilee appears to represent hunting–farming villages founded near perennial streams and springs (Garfinkel, Kislev and Zohary 1988; Horwitz et al. 1999; Kuijt and Goring-Morris 2002; Khalaily et al. 2008). The material culture in this region was rich and comparable to other Mediterranean woodland regions of the southern Levant. The domestic architecture comprised rectangular houses built mainly of mud-brick walls and lime-plastered floors (e.g., Banning 1998; Khalaily et al. 2008). Ritual activities, in particular mortuary practices, were well-developed. The diverse and complex burial customs included indoor, sub-floor burials and outdoor burial complexes (Hershkovitz, Garfinkel and Arensberg 1986; Goring-Morris 2000; Goring-Morris and Horwitz 2007; Barzilai and Getzov 2008; Eshed, Hershkovitz and Goring-Morris 2008; Khalaily et al. 2008). Some of these burial complexes were clearly related to public architectural complexes in which rituals may have occurred (Barzilai and Getzov 2008; Goring-Morris et al. 2008). A common denominator among all PPNB sites in the Mediterranean woodland regions was the use of lime-plaster for constructing graves and modeling plastered skulls, such as those uncovered at Yiftaḥ’el and Kefar Ha-Ḥoresh (Goring-Morris et al. 1995; Hershkovitz et al. 1995; Khalaily et al. 2008; Milevski et al. 2008).

The chipped-stone industries of Lower Galilee during the PPNB period relied mainly on the local, fine-grained Eocenic flints, termed Ha-Sollelim flint (Barzilai 2010b:25–28), although other sources were used as well. The knapping technologies were mainly aimed at producing bidirectional blades, bifacial tools and ad-hoc flakes (Goring-Morris 1994; Barkai 2005; Barzilai 2010b). While flake production did not require well-developed knapping skills, and could have been carried out at any location, the bidirectional blades and bifacial tools were knapped mainly in workshops within the villages or at the site of the flint outcrops, most probably by craft specialists (Oshri et al. 1999; Barzilai 2010b; Barzilai and Goring-Morris 2010; Barzilai and Milevski 2010).

Flint Outcrops and Workshops

Flint outcrops are one of the key elements for comprehending ‘predetermined’ flint knapping of formal lithic technologies and their organization in any given period. Today, we know of at least seven flint outcrops that were exploited by PPNB flint knappers in the southern Levant: ‘En Miri and Har Gevim in Upper Galilee (Barkai and Gopher 2001), Triangulation Point Q-1 in Lower Galilee (Oshri et al. 1999), Wadi Huweijir in the Amman region (Quintero 1996; Rollefson, Quintero and Wilke 2007), Ramat Tamar in the Dead Sea basin (Taute 1994; Schyle 2007) and Jebel Jiththa and ‘Ein al-Idham in the greater Petra area (Muheisen Qadi and Gebel 2004). Documentation of the outcrops in the Amman region and the greater Petra area did not yield many waste products that could associate them directly with PPNB knapping activities. However, enormous amounts of flint-knapping waste products, of the same raw materials, in workshop dumps at ‘Ein Ghazal and Basta, suggest that these sources were exploited for bidirectional-blade production (Gebel 1996). Although the flint outcrop at Triangulation Point Q-1 in Lower Galilee was not excavated, it was probably also exploited for bidirectional-blade as well as bifacial-tool production, as attested by surface finds (Oshri et al. 1999). Due to its proximity to Yiftaḥ’el (c. 1 km), it is assumed that this was the main source of natural flint blocks and preformed cores (Garfinkel 2007). The flint outcrop of Ramat Tamar in the Dead Sea basin was probably also used for bidirectional-blade and bifacial-tool production. Systematic excavations followed by experiments (Taute 1994; Schyle 2007; Barkai, Gopher and Weiner 2007) demonstrated a complex organization of lithic-tool production that involved quarrying the flint and the establishment of primary workshops at the Ramat Tamar outcrop. The preformed tools were then transported to a temporary settlement at Meẓad Mazzal (c. 1.7 km to the east) for finishing. Due to the absence of permanent settlements in the Dead Sea basin, it is assumed that the entire operation was performed on a seasonal basis by non-local communities (Taute 1994).

Flint-knapping workshops are rarely preserved at archaeological sites due mainly to post-knapping activities that included distribution of the designated products and disposal of the knapping wastes (e.g., Clark 1991). As a result, their identification within Neolithic settlements relies mainly on refuse dumps,[2] and in a few cases also on stocks and caches (e.g., Gebel 1996; Barzilai and Goring-Morris 2007; 2010; Barzilai 2010b). At present, all the identified workshop dumps in PPNB settlements in Lower Galilee contained bidirectional-blade products (Barzilai 2010b). On the basis of the number, the contents and the contexts of these dumps, three workshop types were identified:

1) Long-term workshops: These are represented by several dumps with differing contents (Barzilai 2010b). Such dumps, containing waste products from specific knapping stages of reduction, were uncovered in the village of Yiftaḥ’el (Marder, Khalaily and Milevski 2012).

2) Short-term workshops: Such workshops are represented by a single dump that included waste products of all stages of the reduction sequence except for the cores. These were identified at sites such as Kefar Ha-Ḥoresh (Barzilai and Goring-Morris 2010) and ‘Atlit-Yam (Galili 2004). These dumps were noted to contain huge amounts of chips, an indication of careful cleaning of the specific knapping locales.

3) Workshop sites located near flint outcrops: These are represented by one or more waste dumps. Such sites were reported at Triangulation Point Q-1 (Oshri et al. 1999) and Giv‘at Rabi (East), where several discrete clusters of knapping waste were noted (Barzilai and Milevski 2010).

THE SITE

Giv‘at Rabi (East) is located in a small valley not far from the regional water divide in Lower Galilee, a region with plentiful fresh-water sources, including perennial streams and springs, and seasonal lakes and swamps during the rainy season (Orni and Efrat 1971:75). Accordingly, the vegetation is typical of Mediterranean woodland regions, including open-park forests (Zohary 1980).

The vicinity of Giv‘at Rabi has undergone several surveys and test excavations in recent years that have revealed prehistoric remains dated to the Middle Palaeolithic, PPNB, PN

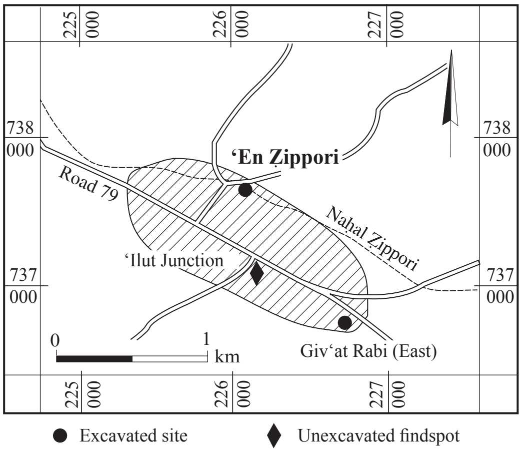

Fig. 2. Map of Giv'at Rabi and the surrounding area, showing the location of Neolithic finds.

and Chalcolithic periods and the Early Bronze Age (Gal 2002; Khalaily and Marder 2009; Barzilai 2010a). The PPNB remains were noted in three localities, probably representing a large settlement, along the southern bank of Naḥal Ẓippori (Fig. 2). The westernmost occurrence was documented in an excavation in 2007 near the spring of 'En Ẓippori (Barzilai 2010a; Getzov et al. 2011). Although the PPNB finds were few, they included diagnostic flint artifacts such as arrowheads, sickle blades, bifaces and bidirectional blades. The second concentration was noted at 'Ilut Junction, following unauthorized construction works (Khalaily and Marder 2009). The exposed remains

Fig. 3. The excavation areas at Giv'at Rabi (East).

included walls and flint-knapping wastes, possibly workshop dumps. The easternmost locality was recorded in a survey conducted on behalf of the Israel Antiquities Authority in 2006 (Khalaily and Marder 2009). Within this locality, one findspot (Plot 3) was noted to contain bidirectional-blade and biface knapping wastes and therefore assumed to represent Neolithic workshop dumps. Consequently, Plot 3 was excavated in the current project under the designation Area A (Fig. 3; Barzilai and Milevski 2010).

The investigated area in this project focused on a shallow basin that extends across an area of c. 200 dunams (Fig. 3). Three excavation areas were opened: Area A in the northeastern corner of the basin, which is the focus of this report; Area B in the western part, where a Roman field wall and rock-cuttings were exposed (Barzilai and Milevski 2010); and Area C in the southeast, which included enormous amounts of Middle Palaeolithic (Mousterian) flint artifacts (Ekshtein et al. 2011). The entire bedrock surface in Area A is covered by a compacted layer of natural and chipped Eocenic flints and some limestone cobbles overlying bedrock of the Timrat Formation (Fig. 4). This bedrock is the source of the large nodular and tabular flint blocks that are suitable for blade and bifacial-tool production (Fig. 5).

Fig. 4. Compacted surface of flint and limestone cobbles (Layer II) as exposed in Sqs C63–C64.

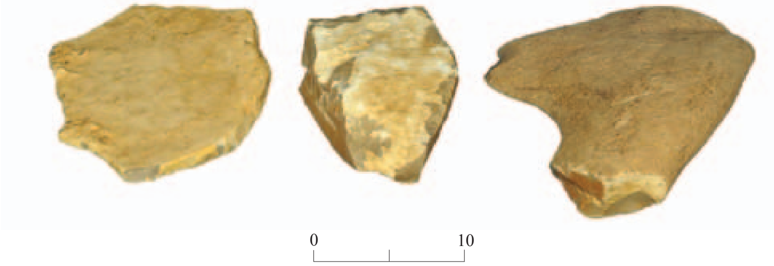

Fig. 5. Natural flint blocks from the Giv'at Rabi (East) outcrop.

THE NEOLITHIC WORKSHOPS IN AREA A

In order to estimate the character and extent of the archaeological remains, four test pits (Sqs AX60, AY57, C63–C64, C73; 30 sq m in total), and four mechanical trenches (T9, T10, T11, T14) were excavated within Area A (see Fig. 3). All showed a similar stratigraphical sequence:
Layer I (0.2–1.0 m thick): dark brown *vertisol* containing a few abraded Roman–Byzantine sherds.
Layer II (0.1–0.2 m thick): a compacted stony layer composed of flint (natural and chipped) and limestone cobbles.
Layer III: bedrock composed of limestone and flint nodules.

Despite the unsuitable, rainy winter conditions, the excavation was conducted according to accepted prehistoric-excavation methods, in 10 cm spits with sieving through a 5 mm mesh. However, these methods were not always efficient, as the sediments were wet and muddy. It became clear during the field work that chipped-stone artifacts were scattered throughout the entire area, lying atop the bedrock layer. Although the identification of stratigraphic horizons was impossible within Layer II, two dense flint concentrations were noted: one in Sq AY57 that consisted of blade- and bifacial-tool knapping wastes, and the other in Sq C73 that consisted of unfinished bifacial tools.

The lithic assemblages from Area A comprise 1426 artifacts (Table 1). Except for one item in Sq AY57, all were made on the local, beige, Ha-Sollelim flint. In order to provide a spatial perspective, the assemblages are described according to squares, presented according to the quality of the loci, from low to high.

Square AX60 (2 × 2 m)
This chipped-stone assemblage contains only 52 items, most of them worn and damaged by modern plowing. Non-diagnostic debitage

Table 1. General Breakdown of the Lithic Assemblages from Area A, according to Squares

	Sq AX60		Sq C63–C64		Sq C73		Sq AY57		Surface		*Total*	
	N	%	N	%	N	%	N	%	N	%	*N*	*%*
Primary elements	9	28	98	40	21	36	187	25	0	0	*315*	*29*
Flakes	19	59	137	55	27	47	418	55	0	0	*601*	*55*
Blades	1	3	4	2	5	9	91	12	1	100	*102*	*9*
Bladelets	1	3	0	0		0	0	0	0	0	*1*	*0*
Initial ridge blades	1	3	1	0		0	20	3	0	0	*22*	*2*
Initial platform spalls	0	0	0	0		0	9	1	0	0	*9*	*1*
Core-trimming elements	1	3	8	3	5	9	31	4	0	0	*45*	*4*
Total	*32*	*100*	*248*	*100*	*58*	*100*	*756*	*100*	*1*	*100*	*1095*	*100*
Chips	0	0	9	15		0	13	10	0	0	*22*	*10*
Chunks	0	0	4	7	4	25	74	56	0	0	*82*	*37*
Intrusive	16	100	46	78	12	75	45	34	0	0	*119*	*53*
Total	*16*	*100*	*59*	*100*	*16*	*100*	*132*	*100*	*0*	*0*	*223*	*100*
Debitage	32	62	248	76	58	67	756	79	1	13	*1095*	*77*
Debris	16	31	59	18	16	19	132	14	0	0	*223*	*16*
Tools	4	8	15	5	10	12	29	3	3	38	*61*	*4*
Cores	0	0	6	2	2	2	35	4	4	50	*47*	*3*
Total	*52*	*100*	*328*	*100*	*86*	*100*	*952*	*100*	*8*	*100*	*1426*	*100*

and intrusive items dominate the assemblage. The intrusive component is mainly patinated Middle Palaeolithic artifacts of which some were made by Levallois technology. The only diagnostic Neolithic item from this square, in fresh condition, is a preformed biface made on a flat tabular block (Table 2).

Squares C63–C64 (4 × 4 m)
The chipped-stone assemblage from Sqs C63–C64 contains 328 items. As in Sq AX60, most of the artifacts display signs of damage from modern plowing and intrusive Middle Palaeolithic items are abundant, while diagnostic finds in fresh condition are scarce. However, the Neolithic presence is attested by unfinished bifaces on tabular blocks, scrapers on cortical flakes and retouched blades (Fig. 6:1, 2; Table 2).

Square C73 (2 × 4 m)
Although the chipped-stone assemblage from Sq C73 consists of only 86 items, the composition of the assemblage and its state of preservation suggest it represents an *in situ* bifacial-workshop dump. This assumption was reinforced by non-systematic refitting attempts that resulted in one aggregate of two conjoinable flakes. The flint items were made on two types of local, Ha-Sollelim flint: fine-grained beige flints and cherty, off-white material. The flints are extremely fresh and are covered with lime incrustations formed by the post-deposition evaporation process. The majority are the result of bifacial-tool production, as attested by the presence of large primary and secondary flakes, lateral (*tranchet*) spalls (Fig. 7:1), unfinished bifaces (Figs. 6:3; 7:2; 8:1) and a broken bifacial tool (Figs. 8:2).

The two cores (a tested nodule and a core on a flake) do not seem to belong to the bifacial production (Table 3). All the tools are bifaces, of which 90% are unfinished, probably unsuccessful preforms (Figs. 6:3; 7:2; 8:1; Table 2). They were made on tabular blocks with cortical faces, or on large primary flakes. The presence of a cortical bifacial tool is notable (Fig. 8:2).

Square AY57 (1 × 2 m)
The largest assemblage (N = 952) in Area A was retrieved from a concentration in Sq AY57 (Table 1). The composition and density of the finds, as well as their similar state of preservation, suggest that they were discarded together. Three technologies are apparent: bidirectional blades, unidirectional blades and bifacial tools. The blade production exploited the local fine-grained flint nodules, whereas the bifaces were manufactured on local tabular blocks and primary flakes of fine-grained beige flint and the cherty, off-white material.

Table 2. Tool Frequencies in Area A according to Squares

Type / Square	AX60	C63–C64	C73	AY57	Surface	*Total*	*%*
Notches and denticulates	1	2	0	4	0	*7*	*11.5*
Ret. Blades	0	3	0	2	0	*5*	*8.2*
Ret. Flakes	1	2	0	2	0	*5*	*8.2*
Perforators	0	0	0	2	0	*2*	*3.3*
Scrapers	1	3	0	4	0	*8*	*13.1*
Preformed/unfinished bifaces	1	5	9	10	2	*27*	*44.3*
Bifaces	0	0	1	5	1	*7*	*11.5*
Total	*4*	*15*	*10*	*29*	*3*	*61*	*100.0*

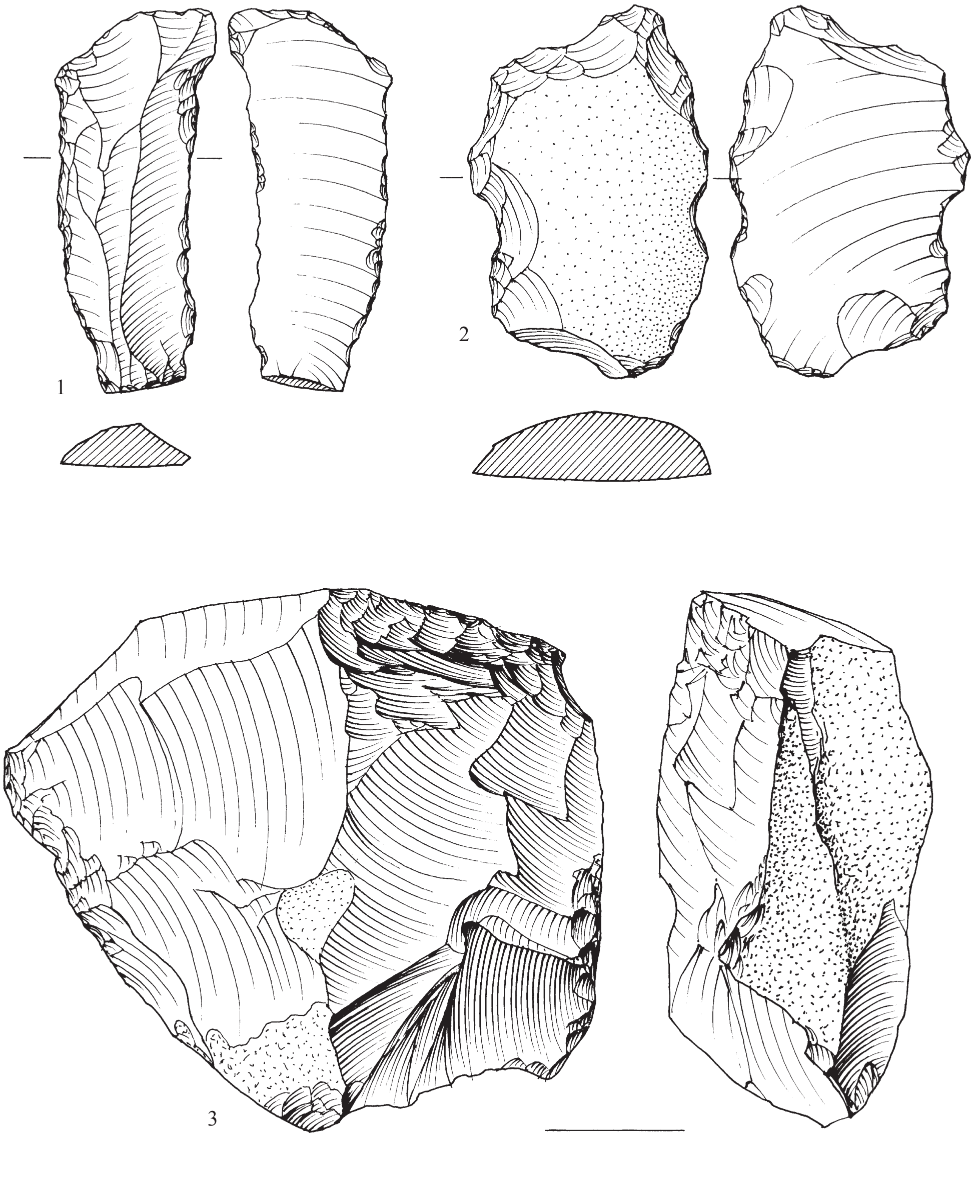

Fig. 6. Neolithic tools from Sqs C63–C64 and C73: (1) retouched blade (C63–C64); (2) cortical scraper (C63–C64); (3) unfinished biface (C73).

The assemblage was divided into diagnostic and non-diagnostic debitage types (Table 4). The non-diagnostic material includes primary elements (items bearing over 25% cortex on their dorsal face), flakes and core-trimming elements. The primary elements and flakes show a similar size pattern (Table 5): c. 33% are small blanks (3–5 cm longest axis), c. 21% are

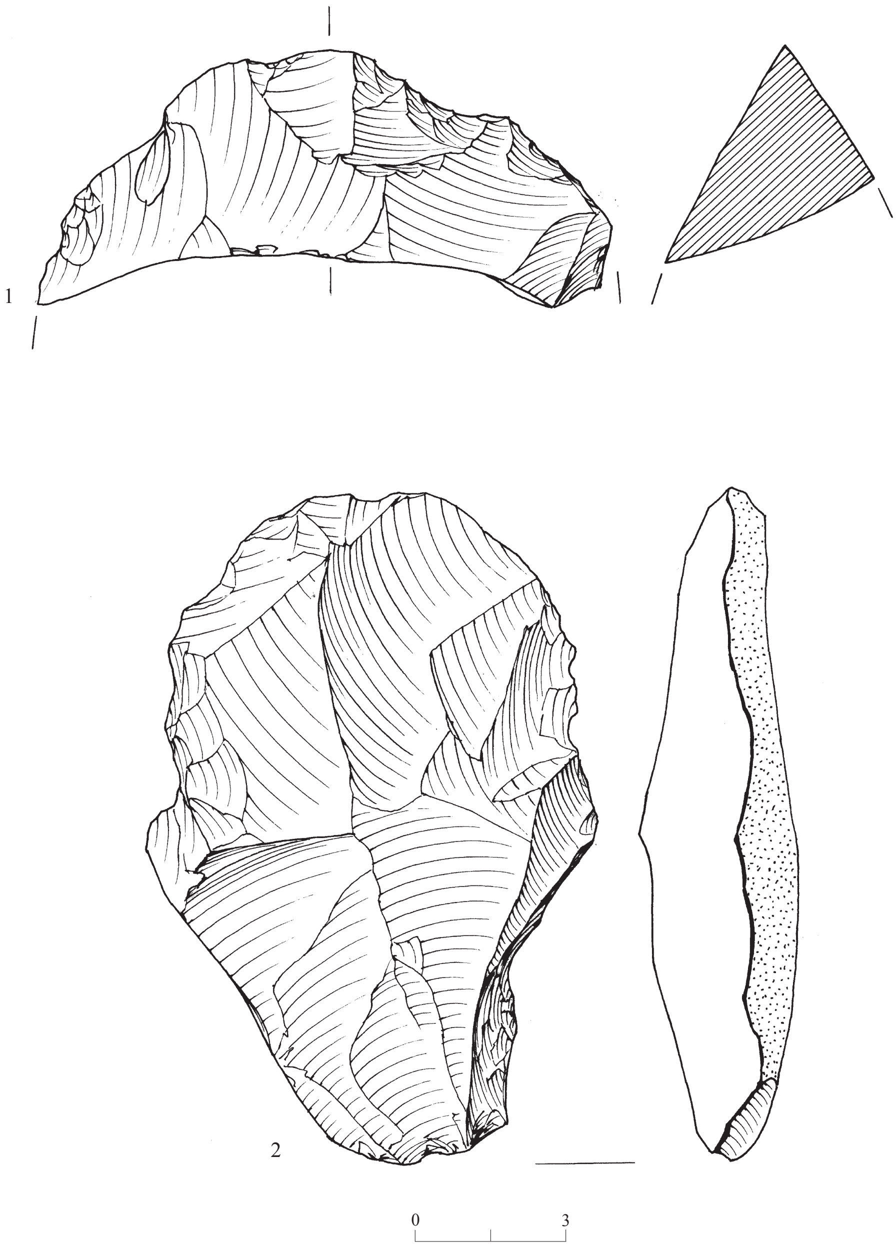

Fig. 7. Bifacial tools from Sq C73: (1) lateral (trachet) spall of a biface; (2) unfinished biface.

medium-sized items (6–8 cm longest axis), and c. 9% are large blanks (longest axis over 9 cm). The remaining items are fragments. This size pattern suggests that the preforming knapping stages (probably of all three technologies) are present. The initial stage (rough out) is attested by the relative abundance of large, thick, primary elements and flakes, while the next stage (final preformation) is represented by the medium and small items, and includes thin,

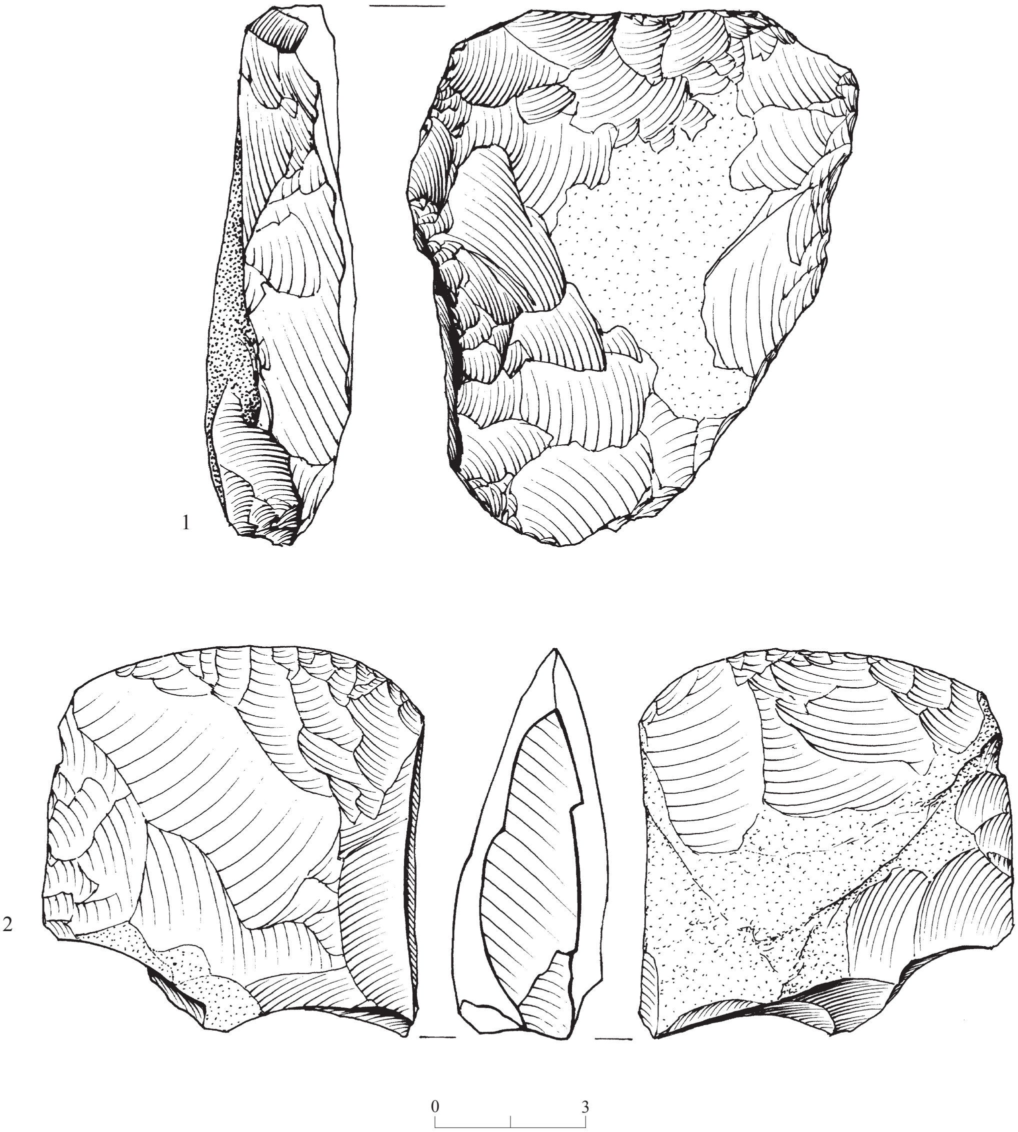

Fig. 8. Bifacial tools from Sq C73: (1) unfinished biface; (2) broken cortical axe.

elegant flakes characteristic of the bifacial-tool and/or bidirectional-blade technologies (Barkai 2005; Barzilai 2010b).

The 31 core-trimming elements (Table 4) cannot be attributed with certainty to a specific stage within the reduction sequence, although some may derive from the preformation and/or the maintenance stage.

The cores and diagnostic debitage (Tables 3, 4) indicate the presence of bidirectional and unidirectional blade technologies. The bidirectional was more common, as these cores constitute 80% of the blade cores (Table 3), and the most common subtype is the *postero-lateral* core, which had the base laterally prepared. These bidirectional-blade cores have a flat,

Table 3. Core Type Frequencies in Area A according to Squares

Type \ Square	AX60	C63–C64	C73	AY57	Surface	*Total*
Preform	0	0	0	3	0	*3*
Tested nodule	0	3	1	1	0	*5*
Flake (polyhedral)	0	2	0	0	0	*2*
Flake (centripetal)	0	0	0	2	0	*2*
Flake (Levallois)	0	0	0	0	0	*0*
Flakelet	0	0	0	1	0	*1*
Blade (bidirectional)	0	0	0	20	4	*24*
Blade (unidirectional)	0	0	0	5	0	*5*
Bladelet	0	0	0	1	0	*1*
Fragment	0	1	0	2	0	*3*
Core on flake	0	0	1	0	0	*1*
Total	*0*	*6*	*2*	*35*	*4*	*47*

Table 4. General Breakdown of the Debitage in Sq AY57

	N	%
Non-Diagnostic		
Primary elements	187	29.4
Flakes	418	65.7
Core-trimming elements	31	4.9
Total	*636*	*100.0*
Diagnostic		
Initial platform spalls	9	7.6
Initial blades (*lames a crête*)	20	16.8
Bidirectional blades	62	51.3
Unidirectional blades	29	24.4
Total	*120*	*100.0*
Non-diagnostic debitage	636	84.2
Diagnostic debitage	120	15.8
Total	*756*	*100.0*

Table 5. Group Size (in Diameter) and Breakage Pattern of the Non-Diagnostic Blanks in Sq AY57

	Primary Elements		Flakes		Total	
	N	%	N	%	N	%
Small Blanks						
3 cm	3	5	36	26	39	20
4 cm	23	42	46	33	69	35
5 cm	29	53	58	41	87	45
Total	*55*	*100*	*140*	*100*	*195*	*100*
Medium-Sized Blanks						
6 cm	24	53	41	53	65	53
7 cm	12	27	25	32	37	30
8 cm	9	20	11	14	20	16
Total	*45*	*100*	*77*	*100*	*122*	*100*
Large Blanks						
9 cm	6	30	7	22	13	25
10+ cm	14	70	25	78	39	75
Total	*20*	*100*	*32*	*100*	*52*	*100*
Small	55	29	140	35	195	33
Medium	45	24	77	19	122	21
Large	20	11	32	8	52	9
Fragments	68	36	155	38	223	38
Total	*188*	*100*	*404*	*100*	*592*	*100*

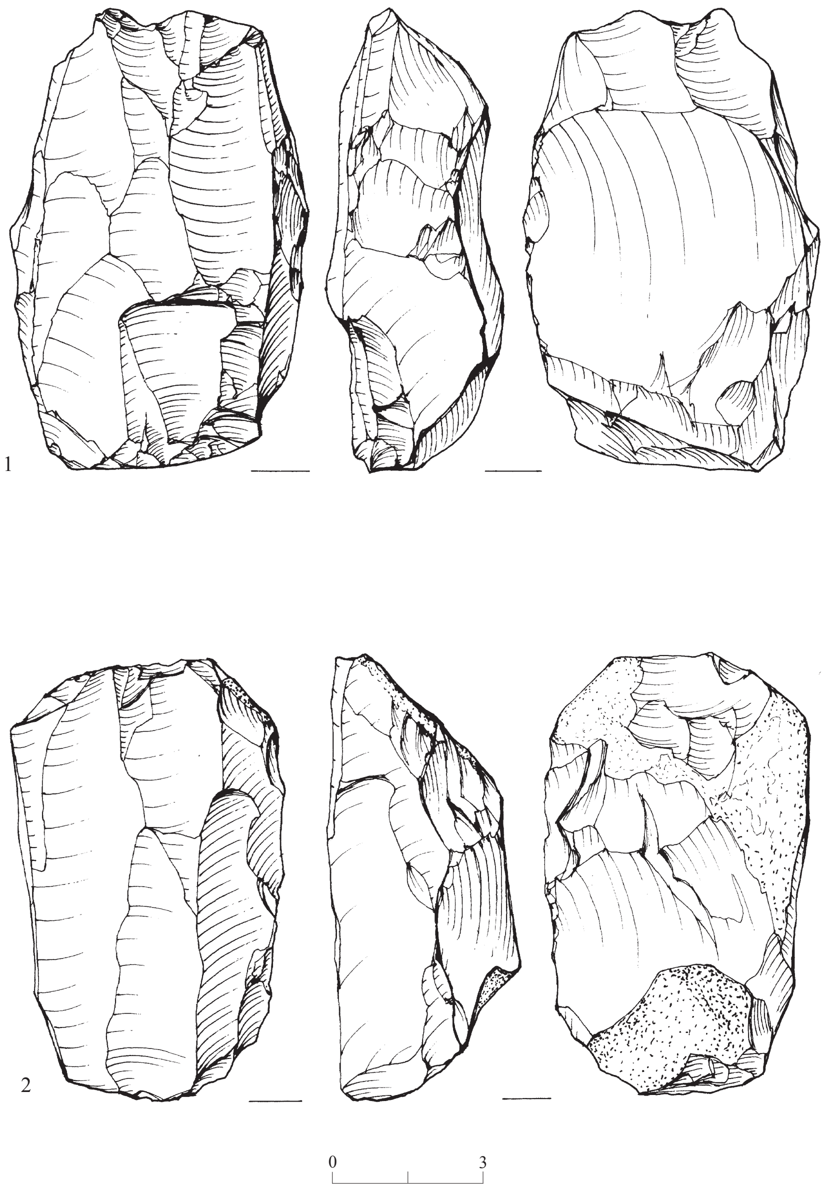

Fig. 9. Bidirectional-blade cores from Sq AY57.

wide configuration and their striking platforms lack abrasions (Fig. 9). The diagnostic bidirectional-blade components suggest that the entire reduction sequence is represented. The stages of 'final core preparation' and 'initial blade production' (Barzilai 2010b:162–163) are attested by initial platform spalls and initial blades (Table 4). The initial platform spalls at Giv'at Rabi (East) are of the unprepared type (Barzilai 2010b:162–163), implying that the lateral ends of the natural nodule required little if any preforming. On the other hand, the front of the core was subjected to meticulous bifacial flaking as most of the crested initial blades show bifacial crest (Fig. 10:1–3). The next stage of bidirectional-blade production is represented

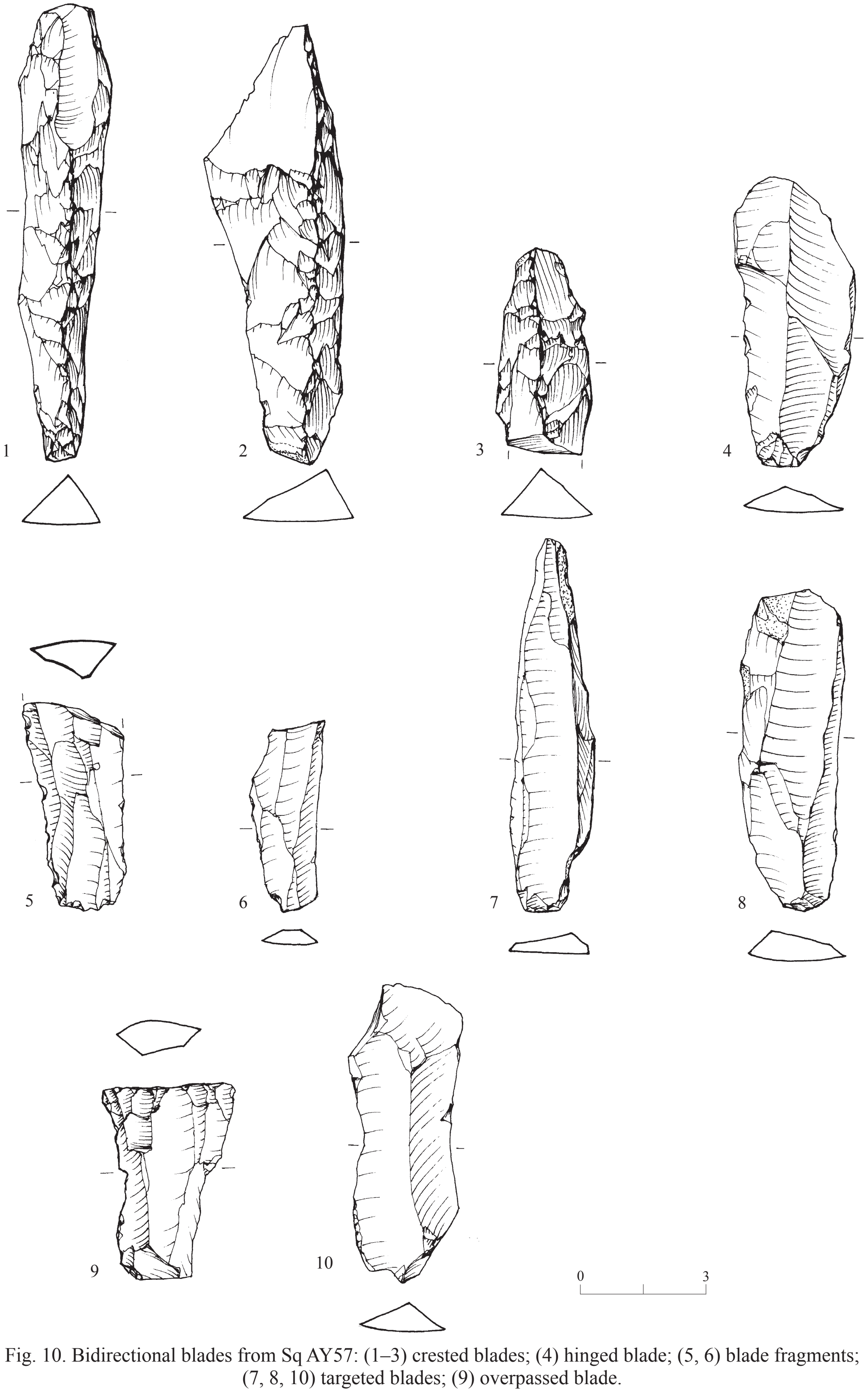

Fig. 10. Bidirectional blades from Sq AY57: (1–3) crested blades; (4) hinged blade; (5, 6) blade fragments; (7, 8, 10) targeted blades; (9) overpassed blade.

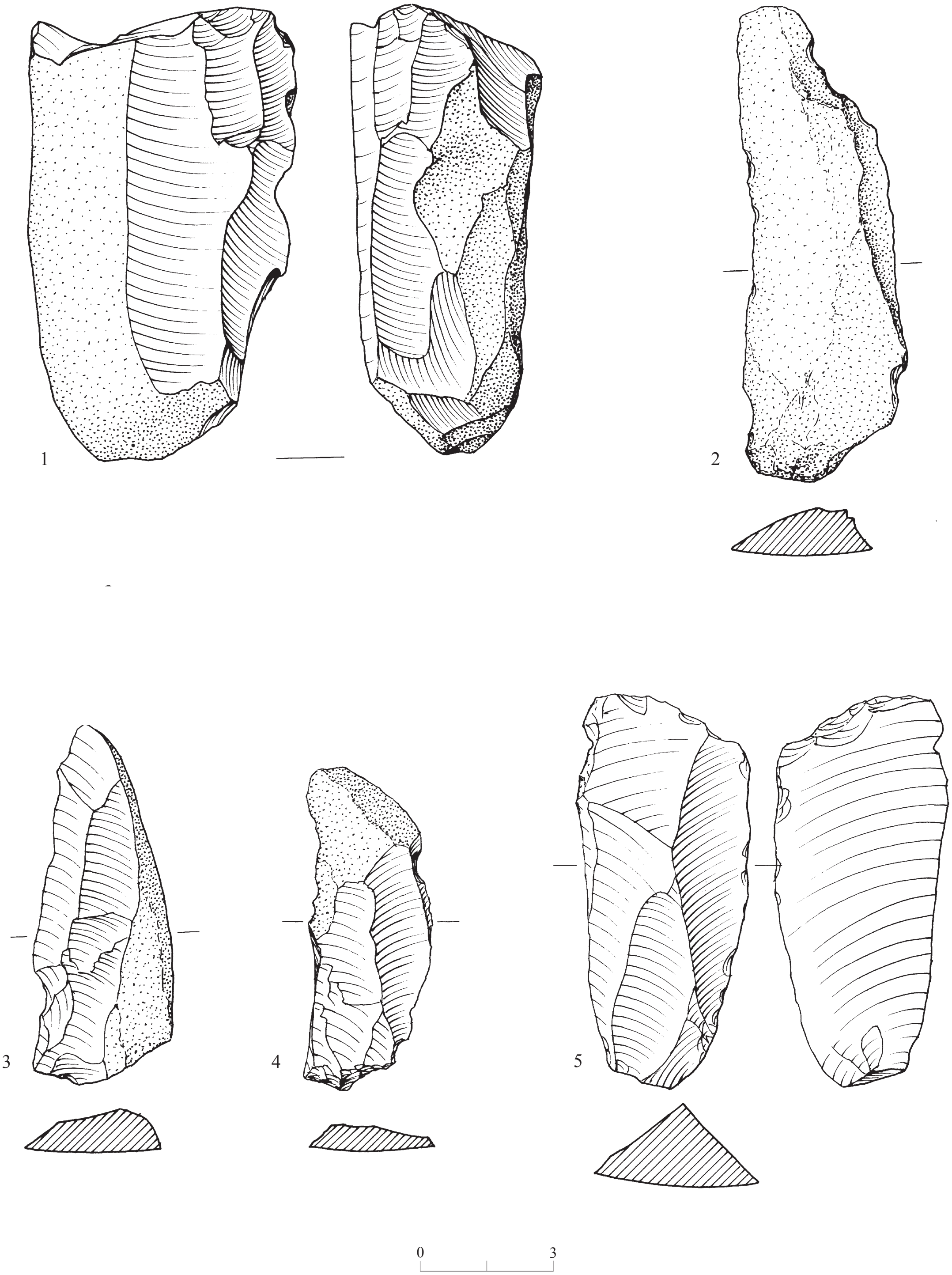

Fig. 11. Unidirectional core and blades from Sq AY57: (1) core; (2) cortical blade; (3–5) targeted blades.

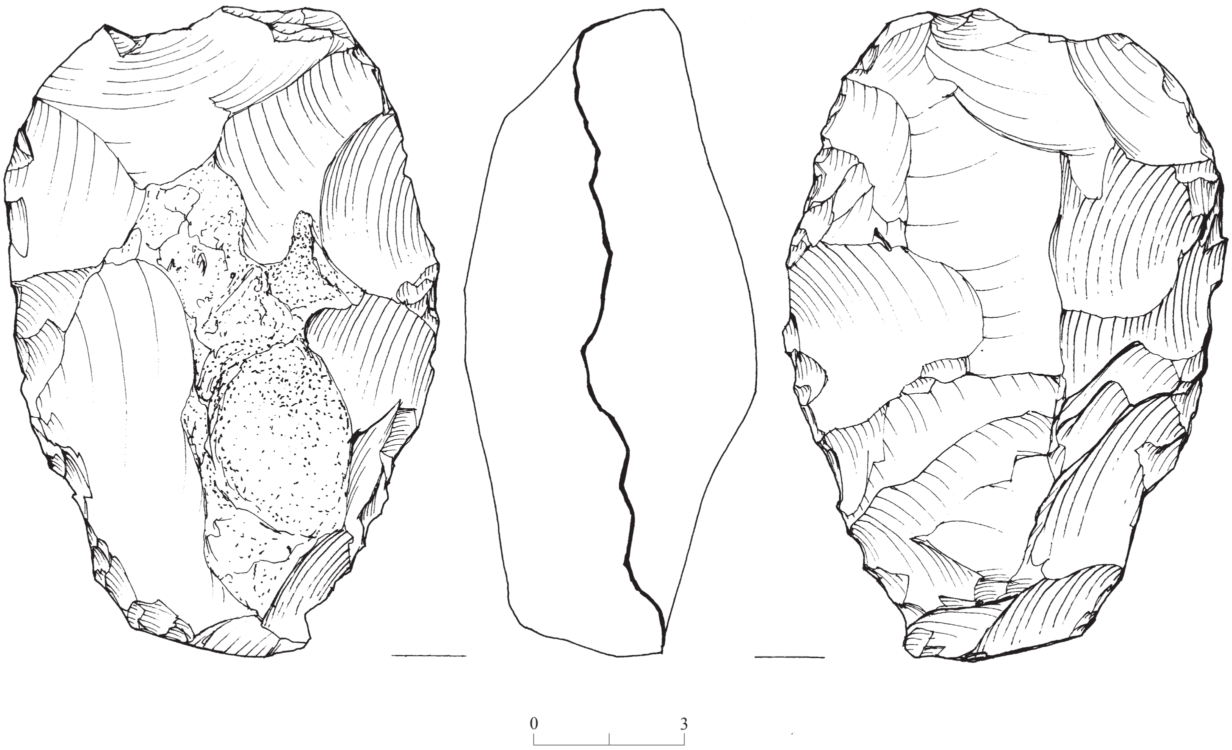

Fig. 12. Unfinished bifacial tool from Sq AY57.

by fragments of targeted blades, hinged blades and overpassed blades (Fig. 10:4–10; Table 4). Notably, the proximal parts of these blades show minor preparations.

The unidirectional-blade technology is attested by several cores (N = 5) and diagnostic debitage (Tables 3, 4). These cores also have wide proportions and lack preparation on the striking platform (Fig. 11:1). Notably, the opening of the blade removal surface followed extraction of an initial cortical blade (Fig. 11:2). Unidirectional blades are represented by several short, wide items (Fig. 11:3–5).

The tools in Sq AY57 are relatively few and comprise mainly bifacial tools (Tables 1, 2). The presence of unfinished bifaces in this assemblage emphasizes tool production at this locality (Figs. 12, 13). The unfinished bifaces bear cortical face/s and were made on tabular blocks or large cortical flakes, similar to those from Sq C73. Therefore, it is reasonable to assume that the two workshops were roughly contemporary. It is still unclear if the cortex was left deliberately in the production of cortical axes, or these items were simply discarded in the early stages of production (i.e., before polishing).

Most of the finished bifaces were broken, probably during the manufacturing process, although some were complete (Fig. 13:1). Like the unfinished bifaces, they were also made on tabular blocks or large cortical flakes. The other diagnostic tools from this square are retouched blades and cortical scrapers. The remainder are ad-hoc, non-diagnostic tools.

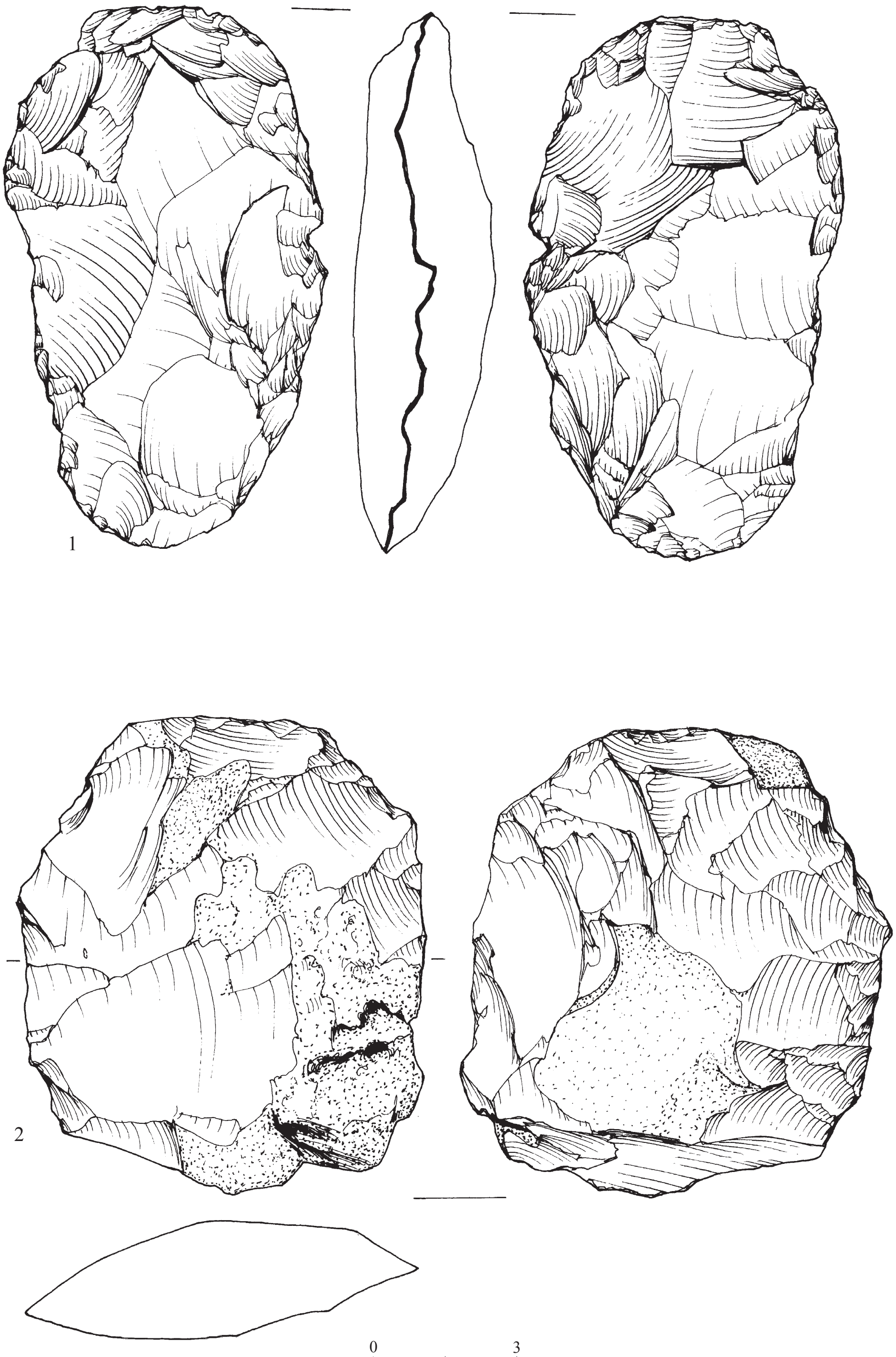

Fig. 13. Bifacial tools from Sq AY57: (1) axe; (2) unfinished biface.

DISCUSSION

The technological analysis of the assemblages from Area A reveals that most of the flint items in Sqs AY57 and C73 were the by-products of formal Neolithic technologies. The composition of the assemblage from Sq C73 suggests that it represents the refuse from a bifacial-tool workshop. The contents of the Sq AY57 assemblage clearly support a multi-purpose workshop in which bidirectional blades, unidirectional blades and bifacial tools were produced. The techno-typological analysis suggests that all knapping stages of the bidirectional-blade production, and probably the unidirectional as well, are represented. The production of both types of blades was probably performed by experienced flint knappers, as attested by the quality of the knapping (Barzilai 2010b). The main refuse of the bifacial technology comprises unsuccessful bifaces, most of them abandoned during the preforming stage. Their presence could represent the work of an apprentice (see, e.g., Davidzon and Goring-Morris 2007; Davidzon and Gilead 2011).

The exact chronology of the Neolithic workshops of Giv‘at Rabi (East) cannot be determined, as no absolute dating was available, and no formal tools that can be placed within the chronological sequence of the Neolithic period, such as arrowheads or sickle blades, were recovered. However, we propose to date these assemblages to the Final PPNB–Early PN periods due to a number of reasons. The bifacial production at the two workshops revealed at Giv‘at Rabi (East) was aimed at manufacturing axes and adzes, as evidenced by the unfinished preforms and the bifacial tools (Figs. 6:3; 7:2; 8; 12; 13). This type of biface is common in the Middle PPNB (Kefar Ha-Ḥoresh, see Goring-Morris 1994: Fig. 11:1), the Final PPNB (‘Atlit-Yam, see Galili 2004: Figs. 114a; 15; 121a; ‘En Ẓippori, see Barzilai 2010a: Fig. 2:1) and the Early PN (Naḥal Zehora, see Barkai 2005: Figs. 46:1; 47:1; 48:1; 51:1; 57). The refinement of the dating to the Final PPNB–Early PN relies on the coexistence of unidirectional and bidirectional blades in the workshop in Sq AY57, a situation also reported in the Final PPNB assemblages of ‘Atlit-Yam (Galili 2004: Figs. 95; 96a; 96b; 124a; 124b; 124c) and Beisamun (Bocquentin et al. 2011: Table 2, Fig. 4), and the Early PN of Sha‘ar Ha-Golan (Barzilai and Garfinkel 2006: Table 2; Matskevich 2011: Figs. 2, 3). This proposal is further reinforced by the characteristics of the bidirectional-blade cores from the workshop in Sq AY57, which display wide dimensions (Fig. 9), similar to those from the Final PPNB period at ‘Atlit-Yam (Galili 2004: Fig. 124c), Beisamun (Bocquentin et al. 2011: Fig. 4:4), Ard el-Samra (Getzov et al. 2009: Fig. 18:1) and the Early PN at Sha‘ar Ha-Golan (Barzilai and Garfinkel 2006: Fig. 4:1–3).

The discovery of Neolithic workshops on top of flint outcrops at Giv‘at Rabi (East), near the large settlement of ‘En Ẓippori (see Fig. 2), suggests they may have been related, and sheds light on the organization of the Neolithic lithic industry in Lower Galilee. Interestingly, a similar pattern of flint workshops in proximity to a village—but outside the residential area—was also recognized at Yiftaḥ’el and ‘Ein Ghazal. Apparently, the workshop at the outcrop at Triangulation Point Q-1 was the major supplier of flint nodules and preformed cores to the PPNB village at Yiftaḥ’el, located 1 km to the northeast (Oshri et al. 1999; Garfinkel 2007). An analogous pattern is attested in the Amman region, in central Jordan, where highly lustrous, purple-pink flints were quarried at Wadi Huweijir and transported c. 2 km as blocks or preformed cores to the village of ‘Ein Ghazal for further production (Quintero 1996). It seems that in all three cases, the dedicated workshops functioned as an ‘industrial zone’ of the large settlement.

This pattern differs from the organization of the lithic industry in the southern regions (Dead Sea basin and greater Petra area), where flint outcrops were located far from the permanent villages; for example, the distance from the Jebel Jiththa and ‘Ein al-Idham outcrops to the village of Basta is c. 7–10 km. It appears that such long distances required organized expeditions from the home villages to travel to the flint outcrops. A seasonal settlement was established at Meẓad Mazzal, c. 1.7 km to the east of the Ramat Tamar outcrop, although the location and distance of the permanent settlement involved in the quarrying and bifacial production there is unknown (Taute 1994). Another example is the transportation of preformed bidirectional cores from the Ma'an Plateau in southern Jordan to 'Ein Abu Nukheyla, a distance of some 40 km (Henry et al. 2003:16–17; Barzilai 2010b:247–248).

The excavation results from Giv'at Rabi (East), and recent technological studies of bifacial and blade workshops from neighboring sites in Lower Galilee, attest to the importance of these formal technologies in the region during the Neolithic period. The final PPNB–early PN lithic-industry organization in Lower Galilee seems to have followed the same principals as that of the Middle PPNB (Barzilai 2010b:55–56): procurement of high-quality flint from outcrops, initial knapping, and transportation to the village for further tool manufacturing. Such patterning demonstrates continuation in the formal technologies and their organization in Lower Galilee from the Middle PPNB into the Early PN.

NOTES

[1] The excavations were conducted by the authors on behalf of the Israel Antiquities Authority (Permit No. A-5367). We wish to thank the following people for their assistance during the fieldwork: Ofer Marder (area supervision), Rivka Mishayev and Tania Meltsen (surveying and drafting), Anastasia Shapiro and Leticia Barda (GPS), Moshe Inbar (geomorphology), Yossi Ya'aqobi (administration), and the workers from Umm el-Faḥm. We are also indebted to Clara Amit (studio photography), Michael Smilansky (flint drawing), Neta Mitki (flint refitting) and Ran Barkai for his critical comments on the first version of this report.

[2] This is also true for the Chalcolithic period (e.g., Gilead et al. 2004).

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