CHAPTER 7

THE CHALCOLITHIC LITHIC ASSEMBLAGE

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The chipped stone assemblage from Givʿat ha-Oranim consisted of 5,982 flint artefacts, including tools, cores, debitage and debris (Table 7.1). Several types of flint were used by the local flint knappers but of these only a few were devoid of cracks and flaws. It seems that the flint nodules are of local origin and little effort was invested in their procurement. Nonetheless, the quality of the raw material is relatively high, with very few limestone inclusions.

TABLE 7.1: MAIN CATEGORIES

Type	*Number*	*%*
Debitage	1776	30
Debris	2784	47
Cores	320	5
Shaped tools	1102	18
Total	5982	100

There are only a few detailed accounts of Chalcolithic lithic assemblages from the southern Levant (Gilead *et al.* 1995; Gopher 1988-9; Levy and Rosen 1987; Marder *et al.* 1995; Noy 1998), and it is hoped that this report will help us gain a better understanding of these Protohistoric stone tools. The methods of lithic analysis used to study the Givʿat ha-Oranim assemblage were developed in recent studies of late Pottery Neolithic flint assemblages (Barkai and Gopher 1999). This also includes standards of bifacial tool analysis that have been used to study a variety of Holocene bifacial tool assemblages from the Levant (Barkai 2000; 2002).

INDUSTRIAL WASTE

More than half of the industrial waste is debris (chunk and chips). Relatively large (over 1.5 cm) flaked items missing the bulb of percussion are as numerous as all of the other debitage and debris categories taken together. The abundance of large chunks could be attributed to the generally selective methods of lithic recovery employed during excavation and/or to the opportunistic nature of lithic reduction at the site. The extraordinarily small number of tiny fragments of knapped flint in the assemblage may be a direct result of the excavation and recovery techniques. Eleven polished bifacial spalls were identified (Barkai 1999) and these spalls could be regarded as by-products of adze resharpening and recycling processes (see below).

TABLE 7.2: DEBITAGE AND DEBRIS

Category	*Number*	*%*
Chips	129	3
Chunks	2655	54
Primary elements	268	5.5
Flakes	1133	23
Blades	176	4
Bladelets	40	1
Core trimming elements	148	3
Bifacial polished spall	11	0.2
Cores	320	6.5
Total	4880	100

Primary elements are not numerous, indicating that some flint nodules were transported to the site and all stages of lithic reduction took place there, while in other cases only blanks and cores were taken to the habitation site and primary reduction was carried out during raw material procurement at the lithic sources.

Flakes are the most dominant blank type, and there are almost five times as many flakes as blades. Blades and bladelets are not numerous, and although it is clear that some of the flakes are by-products of blade production, it seems reasonable to characterize the Givʿat ha-Oranim lithic assemblage as a flake industry with only a minor blade production component.

CORES

The lithic assemblage includes a large sample of cores (Table 7.3, Fig. 7.1). Most of the cores show that blanks were struck from more than one platform (46% of all cores, Fig. 7.1:4-6) while the rest of the cores (37%) were reduced by blows on a single platform (Fig. 7.1:1-3). According to the scar pattern of exploited cores, it appears that flake blanks were the dominant type (79% of the cores, Fig. 7.1:4-6) while on only 20% of the cores had blade scars (Fig. 7.1:1-3). It is clear that blade/bladelet production at Givʿat ha-Oranim was a specific, restricted, reduction strategy and most of the lithic industry was based on flake production. The large numer of multi-platform cores might indicate opportunistic, non standardized core exploitation. Core trimming elements were not found in abundance at Givʿat ha-Oranim and the ratio of C.T.E. per cores is only 0.5: 1. This means that core preparation and maintenance at the site was rare, blank production was not pre-planned and investment in core reduction and treatment was quite poor.

TABLE 7.3: CORES - PRODUCTS AND STRIKING PLATFORM PROPERTIES.

Blank type	*One striking platform*	*Two striking platforms*	*Multi platform*	*Core fragments*	*Sub total*
Flakes	75	43	81	54	253 (79%)
Blade/bladelet	21	10			31 (10%)
Mixed: flake/blade	23	13			36 (11%)
Sub total	119 (37%)	66 (21%)	81 (25%)	54 (17%)	

Total cores = 320

SHAPED TOOLS

Shaped flint tools were relatively abundant (18% of the lithic assemblage). This account focuses on the most prominent tool types in this category, namely sickle blades and bifacial tools (Table 7.4). Their standardized forms and the relatively large numbers of each type enabled their detailed description and characterization as harvesting and woodworking tools (Chapter 8).

TABLE 7.4: FLINT TOOL TYPOLOGY

Tool Type	*Number*	*%*
Retouched items	84	8
Retouched flakes	244	22
Notches & denticulates	363	33
Scrapers	37	3
Borers & awls	45	4
Burins	26	2
Retouched blades	96	9
Retouched bladelets	28	3
Sickle blades	99	9
Bifacial tools	71	6
Varia	9	1
Total	1102	100

Shaped tools are clearly dominated (42%) by retouched blanks (flakes, blades, bladelets and fragments) that were slightly modified by non-invasive retouch .

The second largest group in this assemblage is the notched and denticulated artefacts, comprising 33% of the shaped tools at the site. The relatively large number of sickle blades (9%) and bifacial tools (6%), as well as their standardize character, enables detailed study of these two tool types.

RETOUCHED ITEMS

Mostly unidentified flint fragments missing the bulb of percussion. These exhibit non-systematic retouch at different locations.

RETOUCHED FLAKES

Most of these tools exhibit retouch on either ventral, dorsal or both faces. Only a few are successively retouched around the whole perimeter, and the size and thickness of blanks varies.

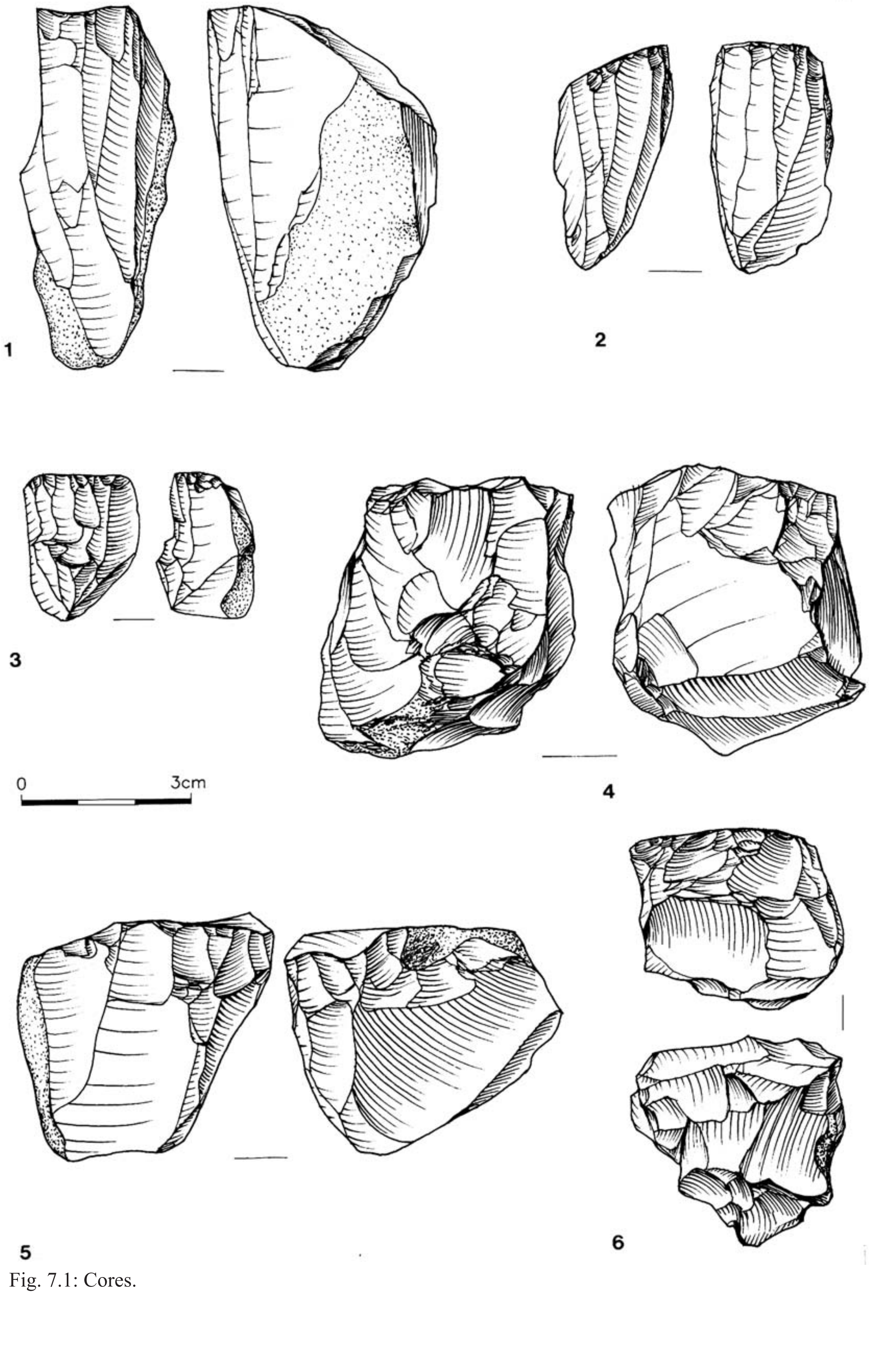

Fig. 7.1: Cores.

NOTCHES AND DENTICULATES

The majority of these tools were produced by a series of blows, with or without additional retouching, while single notches are less common. Blanks show no particular preference – thick flakes (including some C.T.E.), chunks and core fragments were chosen as well as a few blades. No clear patterns were observed in shaping notches and denticulates.

SCRAPERS

Except for tabular scrapers and butt scrapers (Barkai and Gopher 1998) there are no clear-cut criteria for classifying the variety of end/side scrapers. Their *ad hoc* nature fits well with the large groups of retouched flakes and denticulates in the assemblage (Rosen 1997:86-87). For this reason classification of Chalcolithic scrapers sometimes lacks unity. The number of sub-types increases according to typo-technological attributes of the assemblage (Noy 1998:274; Rosen 1997:86). In this report the more general terminology of side versus end scraper, with the addition of the 'simple' type used in the Grar report is preferred (Gilead *et al.* 1995:237).

Simple end/side scrapers (n=29) were produced on flakes of various sizes, blades and chunks (Figs. 7.2:1; 7.3:2). Many of the simple scrapers were made of cortical blanks. The distally retouched end can be either rounded or straight. Scrapers on small flakes show abrupt retouch around the perimeter of the blank, and some are also partially denticulated.

Butt scrapers (Figs. 7.2:5; 7.3:1, n=6) are made on thick flakes and bear abrupt, inverse flaking from the dorsal face, partly or completely removing the bulb of percussion. These items have been described by Barkai and Gopher (1998).

Tabular/fan scrapers (Fig. 7.2:4, n=2). One of the tabular scrapers is elongated in shape and the other is too fragmentary to be described. Both show cortex on the dorsal face.

BORERS/ AWLS

Flakes and blades in a variety of sizes and qualities were used as blanks for this tool type. Some are made on large thick flakes bearing traces of cortex. All tools have a pointed working edge shaped by lateral retouch.

BURINS

The small sample of burins includes several different burin types (on a break, natural surface, dihedral etc.) that were made on different blank types.

RETOUCHED BLADES

These were divided into the following sub-categories:

Simple retouched blades (n=93): Nearly half of the blades were broken. Most of the blades fall within Rosen's 'simple blades' category (Rosen 1997:49-50). Manufactured from different core types, the blades vary in size and other parameters. Retouch is mostly minimal, differing in depth and regularity and occurring on various parts of the lateral edges. A few semi-abruptly retouched ends were shaped as pseudo end-scrapers.

Proto-Canaanean blades (n=2): Following Rowan and Levy (1994), two broken segments of retouched blades were classified as Proto-Canaanean blades. These are made of fine-grained brown flint and their large symmetrical shape resembles Canaanean blades. One of them (Fig. 7.4:2) is 90 mm long, 22 mm wide and 5 mm thick. It has slightly convergent lateral edges, a trapezoidal cross-section and fine regular retouch on both edges. The other blade (75 mm long, 20 mm wide and 7 mm thick) has parallel lateral edges, both finely retouched, an isosceles triangular cross-section and bear cortex on one of its longitudinal dorsal facets. Rowan and Levy refer to such blades from Chalcolithic Gilat as Proto-Canaanean, and noted that Canaanean blades have been found in various Chalcolithic contexts (1994: 168). We adopt this definition for the above blades as well as for two similar glossed items described among the sickle blades.

Retouched bladelets (n=28): Except for 3 patinated pieces, all bladelet tools were made of fine quality flint that could be described as semi-translucent chalcedony. Most of these tools

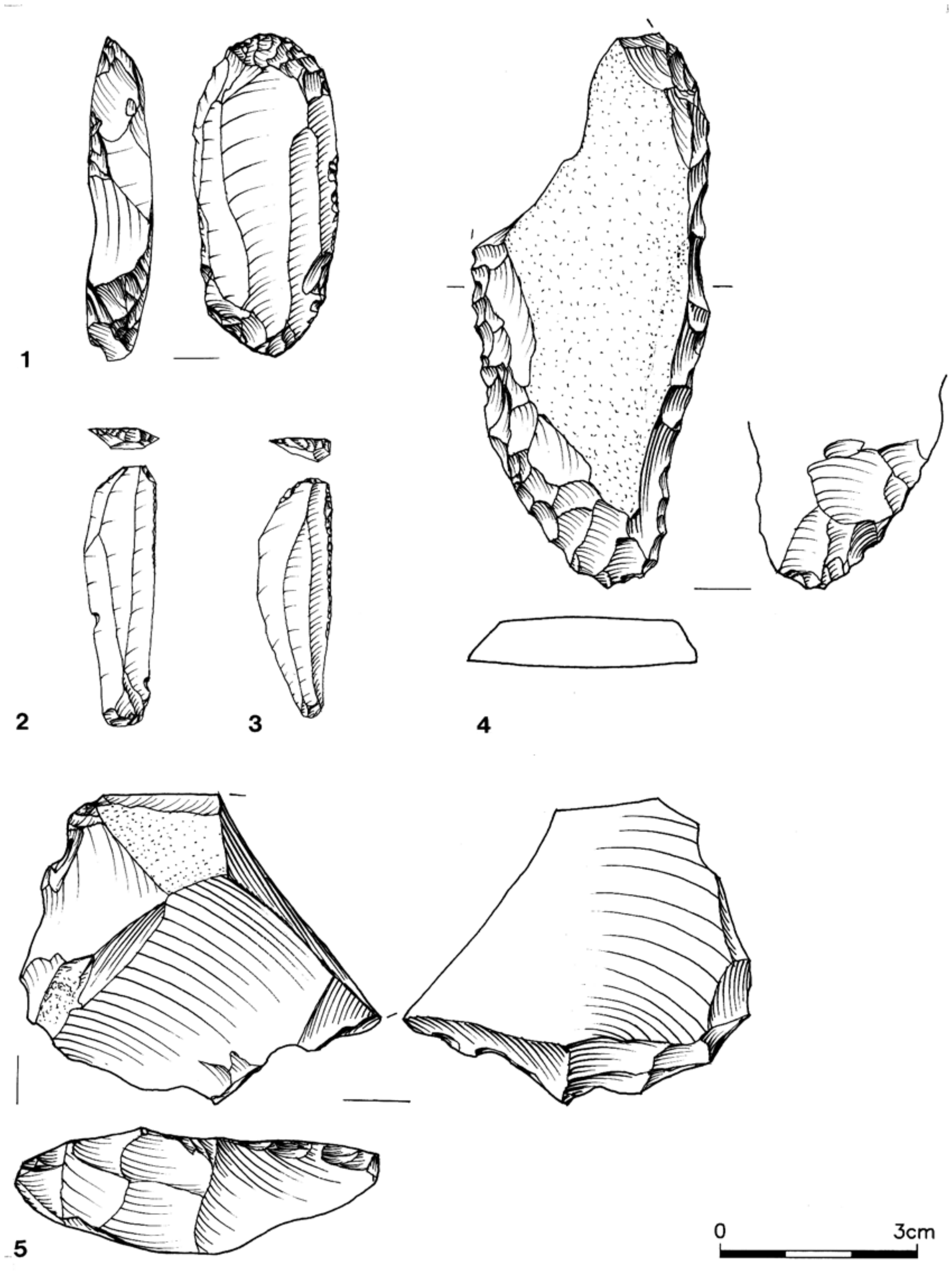

Fig. 7.2: Scrapers. 1) End scraper; 2-3) Micro end scrapers; 4) Tabular scraper; 5) Butt scraper.

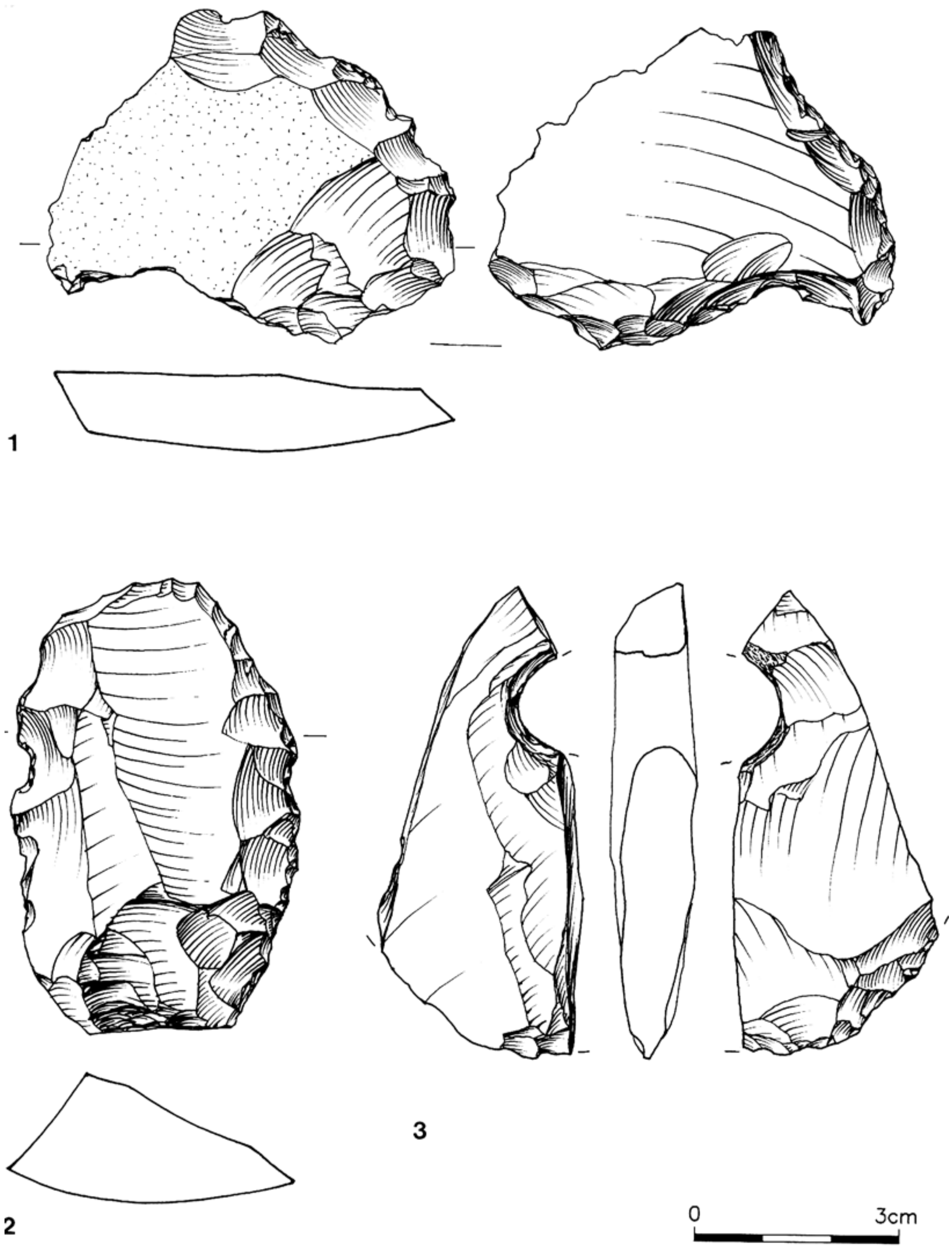

Fig. 7.3: Scrapers. 1) Butt scraper; 2) Side scraper; 3) Perforated disc.

exhibit fine successive retouch extending over a part or all of one lateral edge. Three quarters of the pieces are ventrally retouched. Three micro endscrapers (Fig. 7.2:2-3) were included in the group of bladelet tools. The Givʿat ha-Oranim micro-endscrapers resemble the tool type defined by Gilead (1984). Manufactured from brownish semi-translucent fine-grained flint, all three have one end that was abruptly retouched (usually the distal end). Two of these bear delicate fine retouch on the right dorsal lateral edge, the third bears flat retouch, notches and use signs on both lateral edges.

Micro-endscrapers were reported from Sinai and Negev sites as well as from Ghassul (Gilead 1984) and the Golan sites (Noy 1998: 275). The presence of micro-endscrapers at Givʿat ha-Oranim extends the geographic distribution of this tool type and shows they are typical Chalcolithic tools.

SICKLE BLADES

The primary factor for sickle blade (‘glossed piece’) definition is the appearance of use-wear gloss on the tool edge that is visible to the naked eye. Since the sickle blades of Givʿat ha-Oranim were shaped in a specific manner before use, it was possible to typologically classify as ‘sickle blades’ unglossed blades that have the same typological and technological characteristics as the standardized glossed pieces.

Medium-quality brown or grey/beige flint was preferred for sickle blade manufacture. However, there are a few pinkish and dark brown sickle fragments, all of high quality flint of unknown origin.

Most of the sickles are rectangular in shape (Figs. 7.5:5-6; 7.6) and 15 items have one pointed end (Fig. 7.5:1-4, 7, 8) presumably to facilitate hafting. Most sickle blades (94%) are backed (73% being backed and truncated and 21% backed but not truncated). Five percent are truncated and non-backed.

Within the 77 truncated items (both double and single truncated elements), 64% are ventrally truncated, 32% are dorsally truncated and 4% have one ventral and one dorsal truncated end.

Most of the backed sickles (77%) are abruptly retouched and in most cases (69%) the backing is at the maximum thickness of the blade. Bipolar retouch is rare among the backed sickle blades (only 2%).

Almost all of the artefacts classifed as sickle blades are glossed (98%). The unglossed elements are backed, truncated and seem to be intentionally shaped as sickle blades, but were probably rejected, not used, or not used long enough to allow the formation of gloss (e.g. Marder *et al.* 1995:67; Gilead *et al.* 1995:255). Half of the sickles’ working edges are finely retouched and only 15 items show minimal retouch or plain glossed edges.

Shape of cross-section varies according to the different patterns of the dorsal ridges. Half of the sickle blades have trapezoidal or right-angle trapeze cross-sections. Other cross-sections are isosceles triangle, right-angle triangle or multi-faceted.

Two exceptions in terms of cross-section are broken segments of large prismatic blades (width 22-24 mm) of high quality brown flint (Fig. 7.4:1, 3). The blades are non-cortical. One item is finely retouched on both lateral edges; the other abruptly backed with partly truncated end. Both are glossed. The term Proto-Canaanean that was used to define their non-glossed retouched counterparts (see above) may be applied here as well.

Table 7.5 shows the basic metric attributes of the Givʿat ha-Oranim sickles. Table 7.6 compares their mean length, width and thickness with those from three Northern Negev sites analyzed in the Grar report (Gilead *et al.* 1995:279 table 5.9) and those from various Golan sites (Noy 1998:287).

TABLE 7.5: METRIC DATA OF SICKLE BLADES (in mm).

	*Length**	*Width*	*Thickness*
Mean	42.40	11.50	4.60
Min.	23.00	7.00	3.00
Max.	75.00	25.00**	8.00
N=	38	99	99

* Length measurements were taken for complete sickles only (defined by presence of truncations on both ends or one truncated and one pointed distal end) .

** Proto-Canaanean sickle.

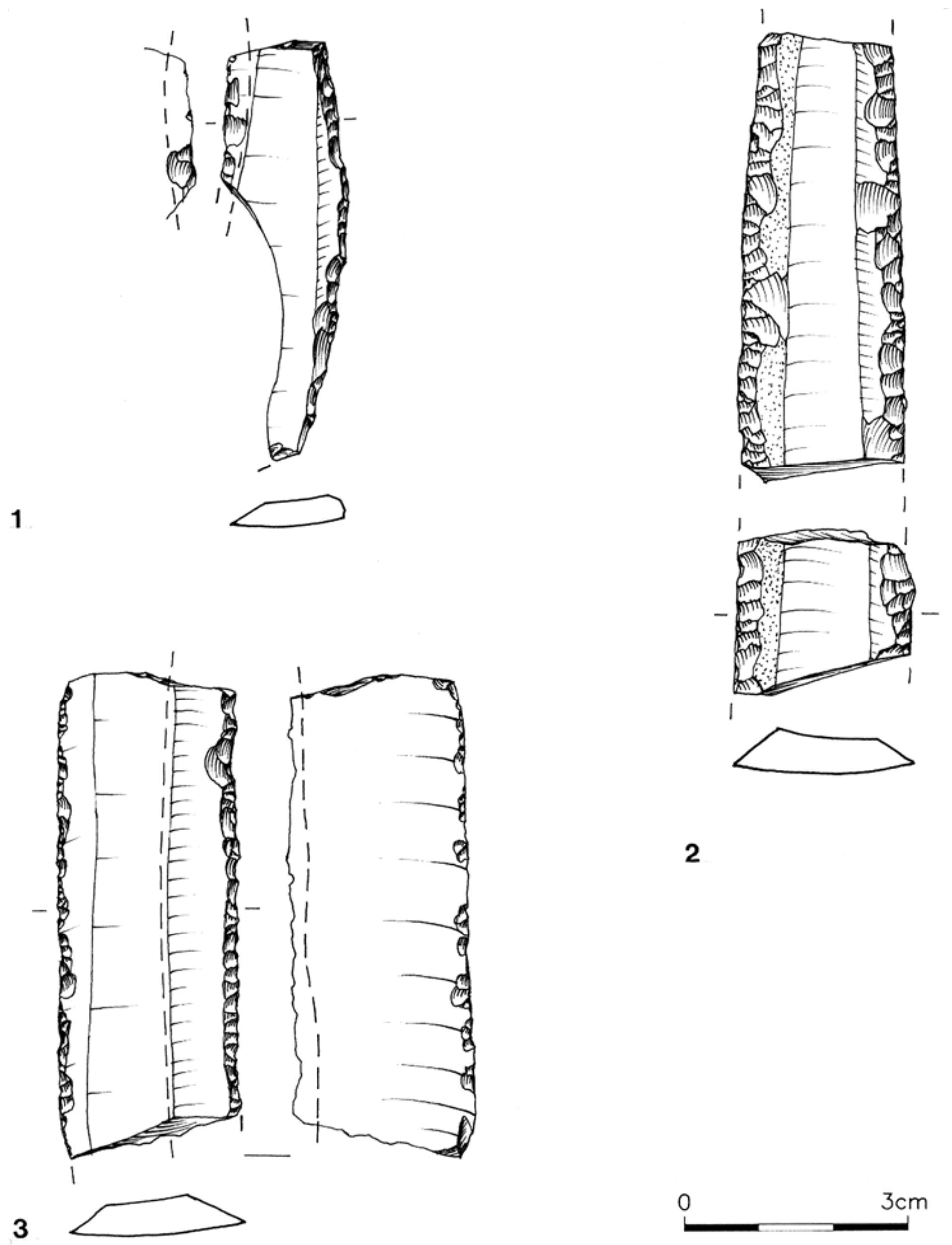

Fig. 7.4: 1, 3) Sickle blades; 2) Blade.

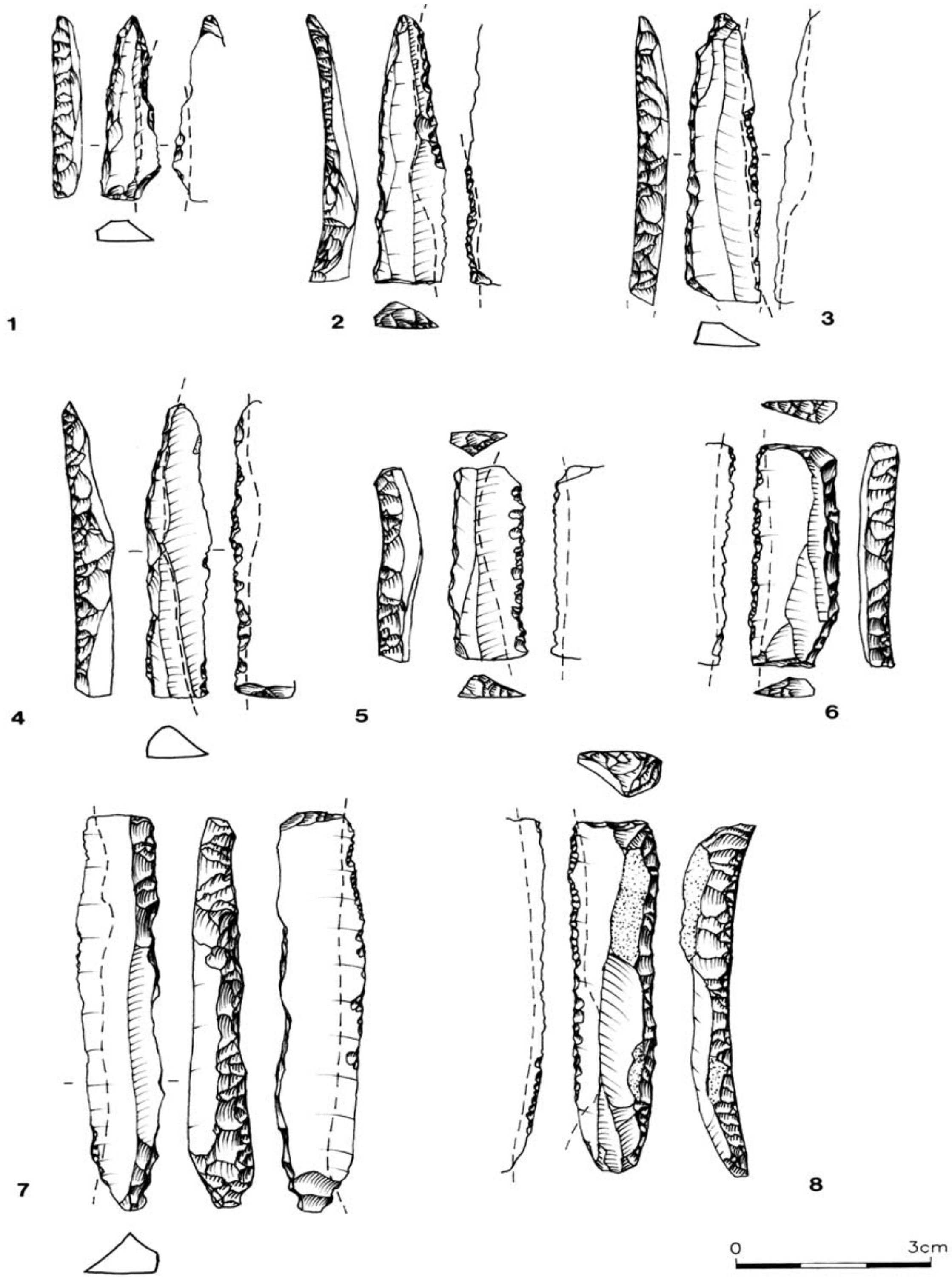

Fig. 7.5: Sickle blades.

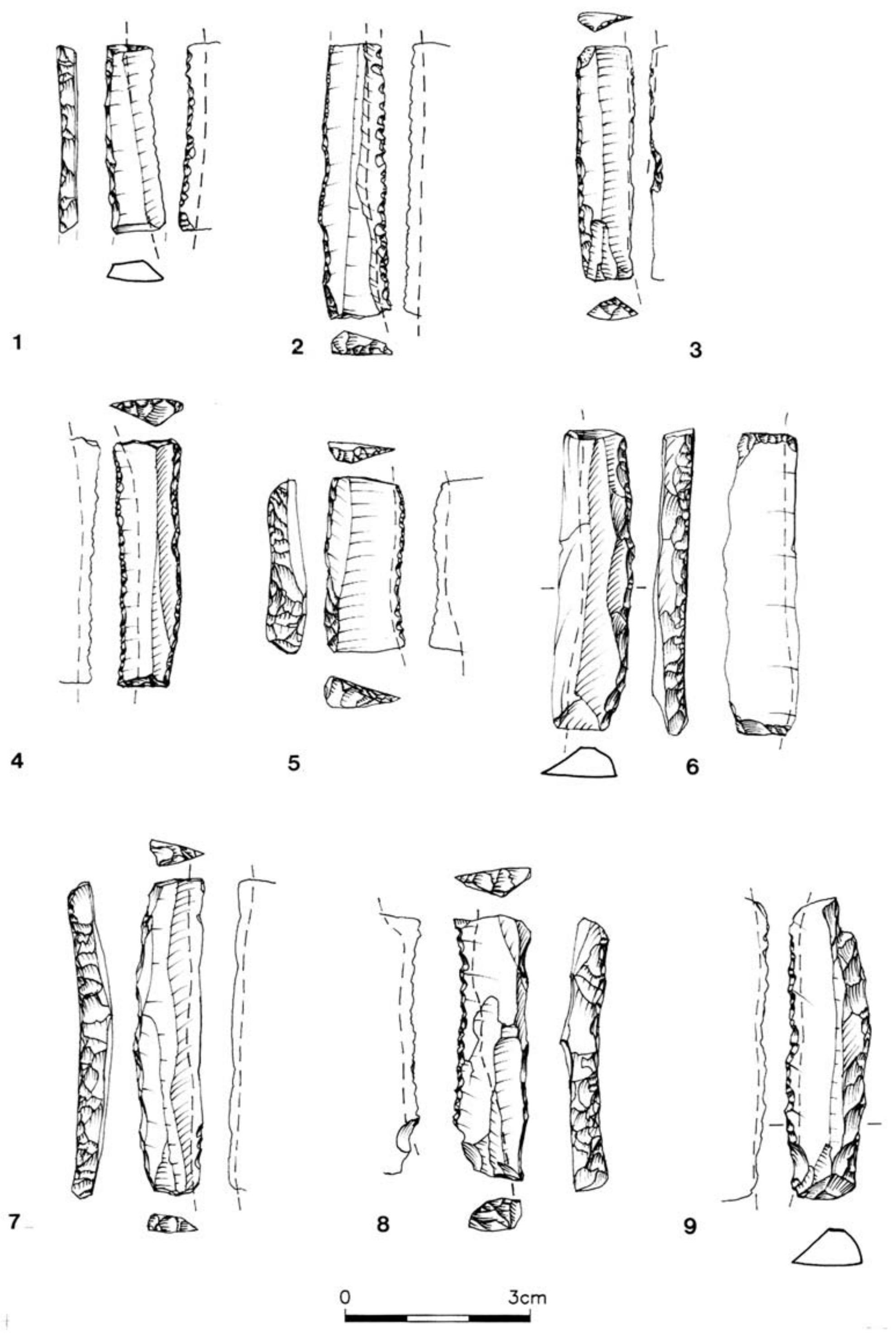

Fig. 7.6: Sickle blades.

TABLE 7.6: COMPARATIVE METRIC DATA OF SICKLE BLADES

	Givʿat ha-Oranim	*Negev sites*	*Golan sites*
Mean length	42.40	31.94	35-47
Min.	23.00	12.00	25
Max.	75.00	68.00	75
N=	38	145	unclear
Mean width	11.50	10.66	17-18
Min.	7.00	6.00	11.00
Max.	25.00	19.00	28.00
N=	99	145	unclear
Mean thickness	4.60	3.40	6-7
Min.	3.00	1.00	2.00
Max.	8.00	7.00	18.00
N=	99	145	unclear

According to the metric comparison presented in Table 7.6, Givʿat ha-Oranim sickles are longer than the Negev sickles and fall just in the middle of the length range of the Golan sickles. It must be pointed out that the fact that the lengths of all 145 Negev sickles were measured and not only the complete specimens, makes the comparison problematic. Comparison with the Golan sickles is problematic as well since their detailed metric data is not clear. For these reasons, there is as yet no database comparable to the length measurements of Givʿat ha-Oranim sickles and more detailed studies must be awaited.

In terms of width, it seems that Givʿat ha-Oranim sickles are only slightly wider than the Negev sickles but much narrower than the Golan examples. The relative similarity in width between the Givʿat ha-Oranim and Negev sickles is reflected not only in the average width but also in the minimum and maximum width measurements. By the same token, the Golan sickles are much wider than their counterparts from Givʿat ha-Oranim and the Negev. Because of the above-mentioned problems of length comparison it is still premature to reach a conclusion regarding the general pre-determined proportions and shape of sickles from the three different regional samples.

Givʿat ha-Oranim sickles are slightly thicker than the Negev sickles and much thinner than the Golan examples. Although dimensions of the latter are unclear, it seems that these sickles are much wider and thicker than sickles from Mediterranean and southern contexts. Sickles from central and southern Israel seems to be relatively similar in width and thickness while length comparisons are still to be desired. It seems that the Golan sickles are exceptional in terms of size, but more detailed studies are necessary in order to demonstrate this. Future studies of Chalcolithic sickles from different geographic and chronological contexts will, hopefully, enable characterization of sickle sub-types according to shape and metric parameters. Only then can the regional differences outlined in this study be confirmed, and the functional, stylistic and behavioural aspects of sickle blade manufacture and use be addressed.

BIFACIAL TOOLS

The lithic assemblage includes 71 flint bifacial tools. The most dominant type is the adze (46.5%, Figs. 7.7-7.9; 7.10:2, 3, 5). Other bifacial tool types are chisels (24%, Figs. 7.10:1; 7.11:1, 2), roughouts (20%, Fig. 7.12), axes (3%) and varia (7%). As at other Chalcolithic sites, here too adzes are the most common type of bifacial tool (Barkai 2000). Chisels appear in relatively high frequencies and together with the adzes they represent a tool kit made of two types of woodworking tools: a wide and large bifacial tool (adze) and a narrow and long bifacial tool (chisel). Axes are very rare at the site. The number of bifacial tools that were discarded during the manufacturing process (roughouts) is relatively high. The bifacial tools were classified according to the following categories:

Adzes are bifacially shaped tools with plano-convex cross-section. The ventral face is mostly flat and the dorsal face is curved, trapezoidal or triangular in section. Working edges are often shaped by bifacial flaking and polish, while the use of transverse blows appears in specific cases. Cutting edge width usually exceeds 2 cm. In shape, most of the adzes were designed as long trapezes or triangles (e.g. Figs. 7.7-7.9).

Chisels are shaped by bifacial flaking, but in some cases more than two faces are shaped. Cross-sections were varied: lenticular, angular, plano-convex, triangular, trapezoidal or rhomboid. The cutting edges are mostly shaped by bifacial flaking, polish or transverse blows

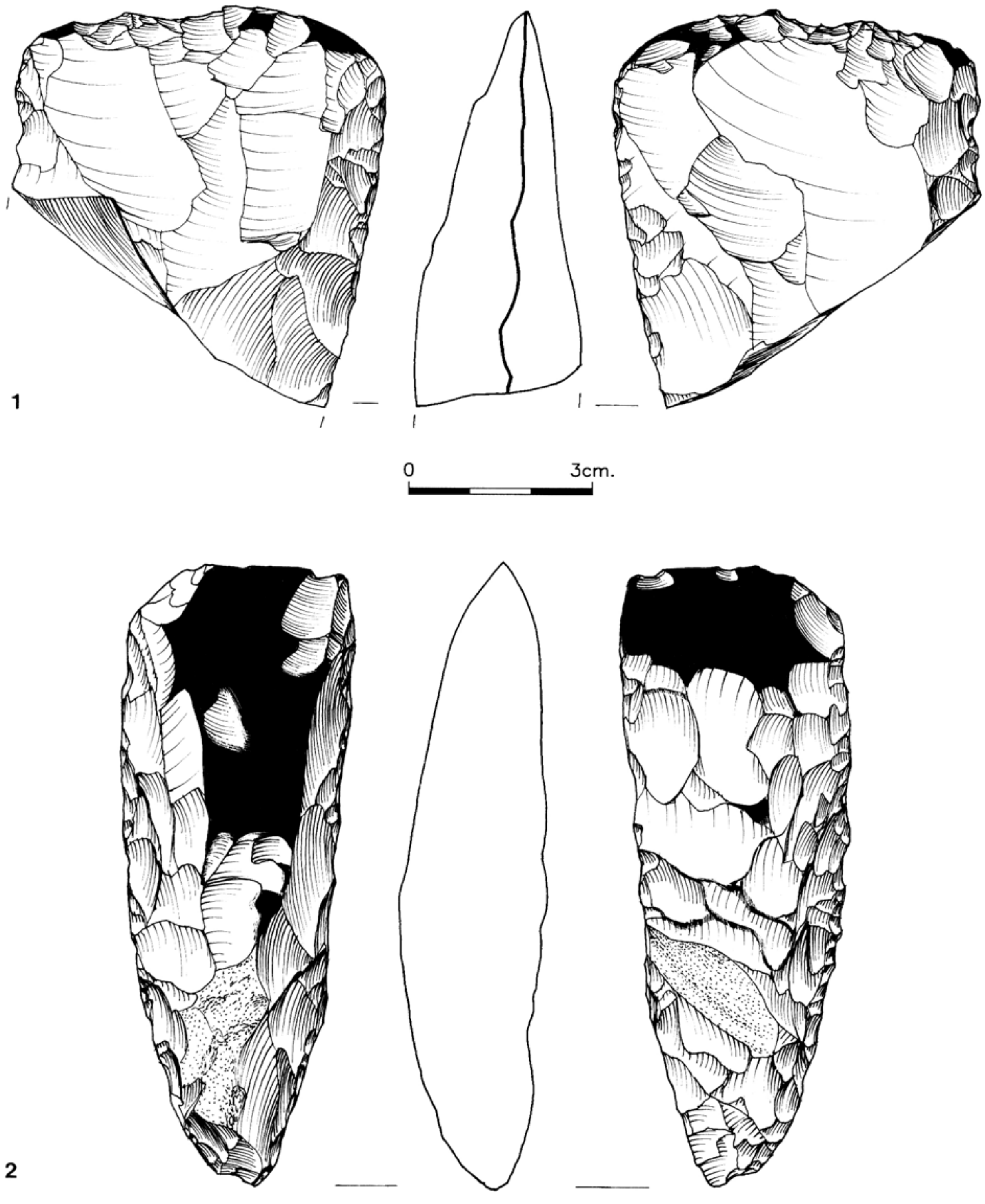

Fig. 7.7: Adzes.

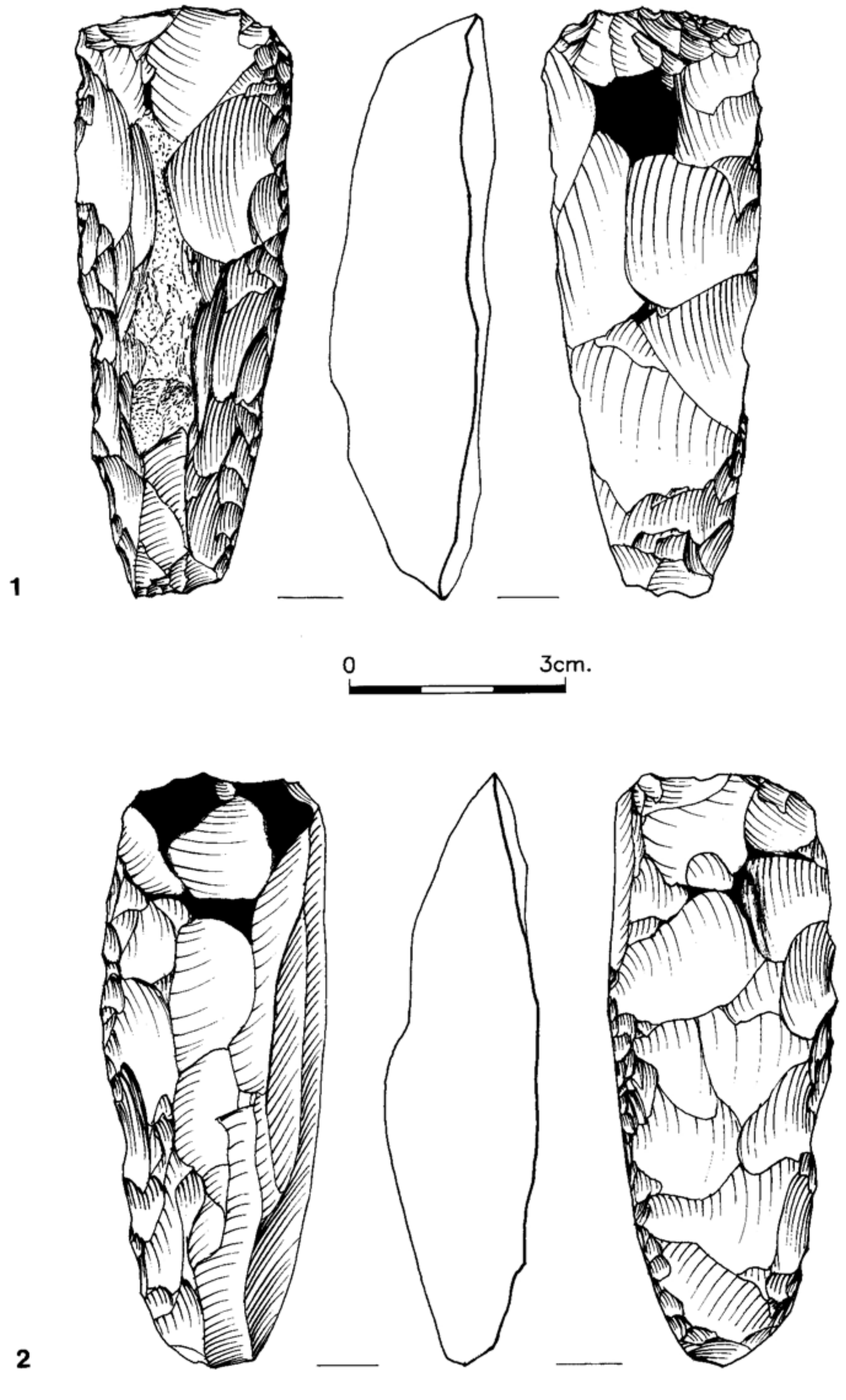

Fig. 7.8: Adzes.

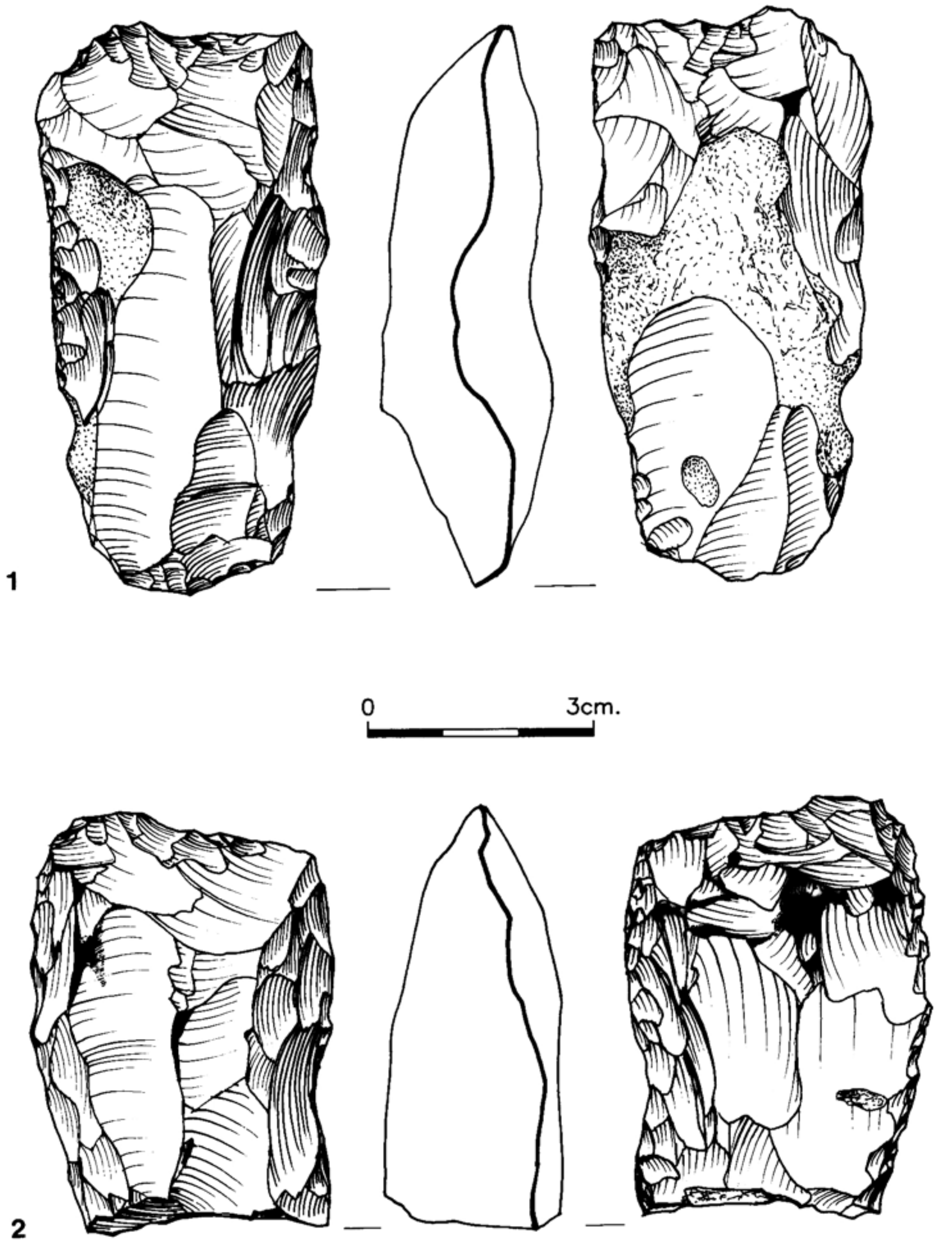

Fig. 7.9: Adzes.

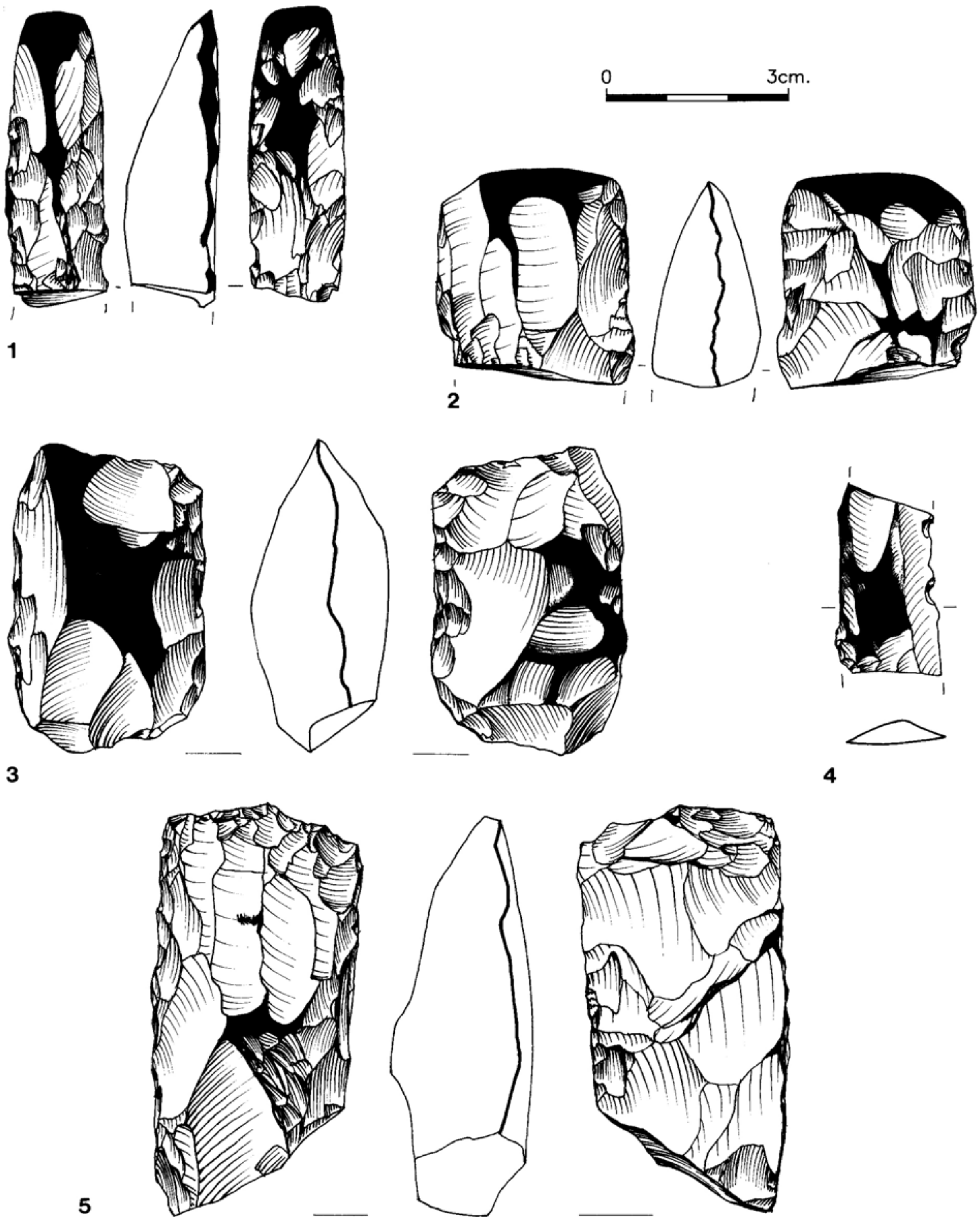

Fig. 7.10: 1) Chisel; 2, 3, 5) Adzes; 4) Bifacial polished spall.

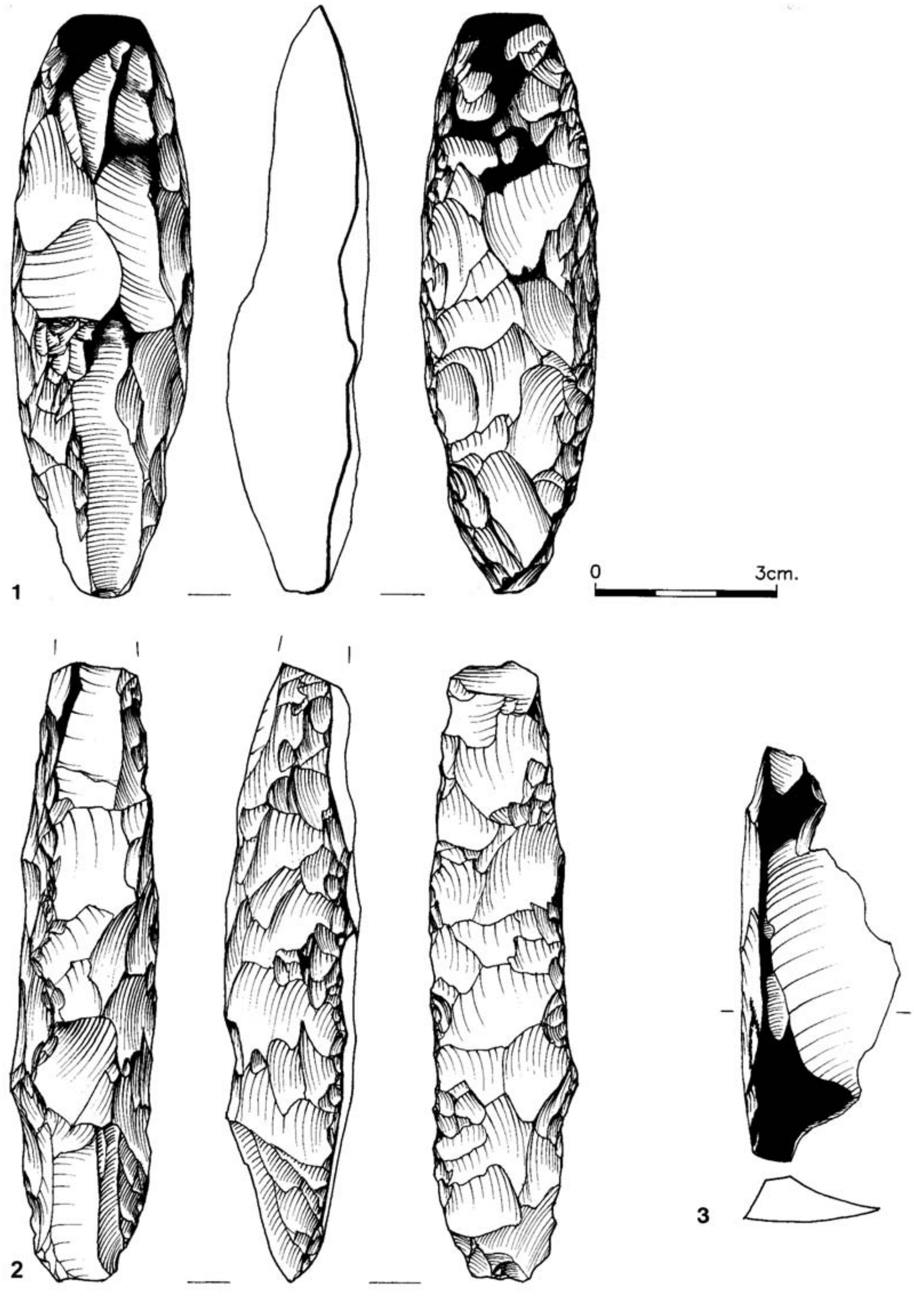

Fig. 7.11: 1, 2) Chisels; 3) Bifacial polished spall.

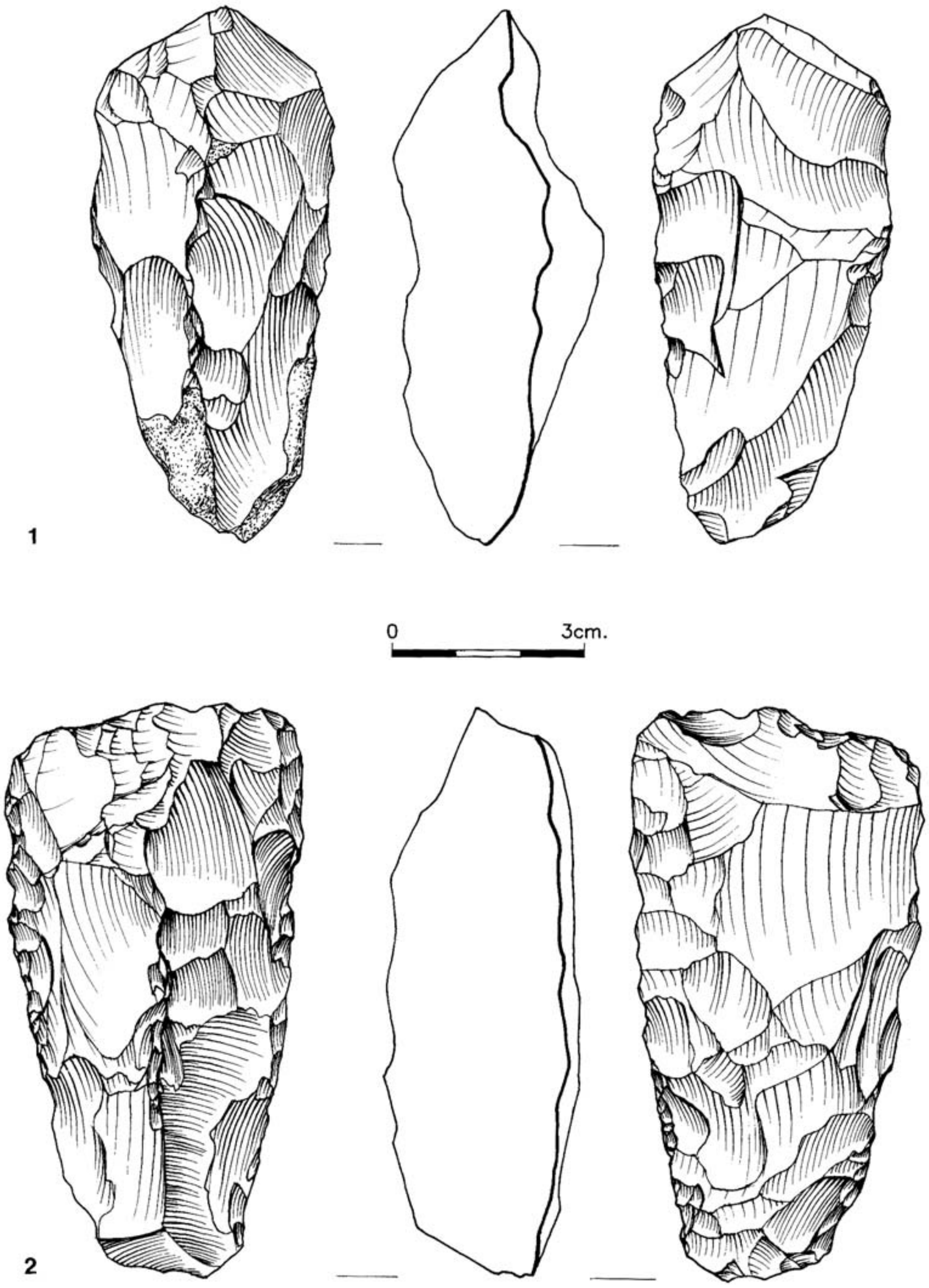

Fig. 7.12: Roughouts.

and their cutting edge width does not exceed 2 cm. in width. Chisels are usually long and narrow (e.g. Fig. 7.11:1, 2).

Roughout (preform) are rough and coarse bifacial tools, most often only partially worked by bifacial flaking. The cutting edge is either shaped or not and most of these tools seems to be discarded before the production process was completed (e.g. Fig. 7.12).

Axes are shaped by bifacial flaking and have a lenticular cross-section. The cutting edge is shaped by bifacial flaking, transverse blows or by polishing and is wider than 2 cm. In many cases the cuting edge is slightly rounded and the general shape of the tools resembles an almond.

Varia include unclassified bifacial tools which do not fit any of the above categories.

Technological and typological analysis

Adzes, chisels and roughouts were subjected to a detailed study aimed at establishing clear criteria for characterizing each type and for understanding the manufacturing process and the standards of production, use and maintenance.

Blanks of bifacial tools

The blanks of most adzes (67%) could not be determined due to extensive bifacial flaking that removed the original blank characteristics (e.g. Figs. 7.8; 7.9:2; 7.10:2, 3). The rest of the adzes were made on blades (18%), nodules (12%, Figs. 7.7:2; 7.9:1) and flakes (3%). More than half of the chisels were made on blades (53%) and most of the rest of the chisels were made on unidentifiable blanks (41%, Fig. 7.11). In only a single case was a nodule used as a blank for chisel production (6%). More than one third of the roughouts were made on flakes (36%) while blades and nodules were used less often (14% and 7% respectively). The blank types of the rest of the roughouts could not be determined (e.g. Fig. 7.12).

It is clear from the above data that blades were preferred for chisel production, most probably because they are close to the desired shape of chisels and less effort would be needed to shape chisels out of blades. For that reason it was possible to identify many of the chisels blanks. While most of the adzes blanks are unidentifiable, many of the roughouts were made on flakes. Since most preforms at Givʿat ha-Oranim resemble early stages of adze manufacture, it could be argued that many of the adzes were originaly made on flakes and only intensive flaking at later stages of the manufacturing process removed the blank characteristics. Some adzes were made on blades, but it is hard to determine the true role of blades in adze production. Nodules were rarely used in bifacial tool manufacture at Givʿat ha-Oranim.

Raw material quality

Half of the Givʿat ha-Oranim bifacial tools were made of relatively high quality non-homogeneous flint with inclusions while only few tools were made of high quality homogeneous flint with no inclusions. The other half of the bifacial tools were mostly made of homogeneous flint of medium to low quality with no inclusions. Only a few adzes were made of homogeneous flint of high to medium quality with no inclusions (6% and 15% respectively). Half of the adzes were made of non-homogeneous high quality flint with inclusions (51.5%) and the rest were made of non-homogeneous flint of medium quality with inclusions (27%). Half of the chisels were made of homogeneous flint with no inclusions of high to medium quality (18% and 35% respectively). The rest of the chisels (47%) were made of high quality non-homogeneous flint with inclusions. More than half of the roughouts were made of medium quality homogeneous flint with no inclusions (57%) while the rest were made of non-homogeneous high quality flint with inclusions (43%).

The optimal combination of raw material properties, namely high quality homogeneous flint with no inclusions, is rare at Givʿat ha-Oranim. In most cases flint knappers compromised on the quality or homogeneity of the raw material. In cases when homogeneous raw material without inclusions was used, it was of medium to low quality. This was apparently preferred over non-homogeneous flint with inclusions which would make the tool less durable and resistant to breakage.

Cutting edge shaping

Just over half of the adzes in this assemblage (51.5%) have broken or lost cutting edges (Figs. 7.8: 1; 7.9; 7.10:3, 5). Thirty percent had cutting edges shaped by bifacial flaking and polishing (Figs. 7.7; 7.8:2; 7.10:2) while the rest (18%) were shaped by bifacial flaking only. Bladelet flake scars aimed at thinning and shaping their working edges appear on the dorsal faces of 9% of the adzes.

The cutting edges of chisels were shaped very similarly to adzes. More than half (53%) have broken or lost cutting edges (Fig. 7.11:2), 29% have cutting edges shaped by bifacial flaking and polishing (Figs. 7.10:1; 7.11:1) and 18% by bifacial or unifacial flaking.

Twenty one percent of the working edges of bifacial roughouts are missing due to breakage. Over one third (36%) of the cutting edges of roughouts were shaped by bifacial or unifacial flaking (Fig. 7.12:2) while 43% did not reach the stage where the working edges were shaped (Fig. 7.12:1).

The large number of adzes and chisels missing their cutting edges due to breakage probably indicates intensive use. Furthermore, it is very likely that the use of non-homogeneous flint with inclusions made the Givʿat ha-Oranim bifacial tools breakage-prone. The use of bifacial flaking and polish in shaping the working edges is prominent and it seems reasonable to suggest that many of the missing working edges were polished as well.

Most of the cutting edges of roughouts were shaped by bifacial/unifacial flaking or not shaped at all. Those that are missing their working edges were most probably broken during manufacture, and not during use like their completed counterparts (mainly polished adzes). Not even one of their cutting edges was polished and thus it could be concluded that these tools were discarded before the working edge was prepared for polishing and in many cases before it was even partially shaped.

Body shaping

Approximately half of the adzes were shaped using bifacial flaking (48.5%) and 36% by bifacial flaking and polishing (Figs. 7.7:2, 7.8, 9; 7.10:2, 3, 5). The rest of the adzes were shaped by partial bifacial and unifacial flaking (15%). A similar proportion of the chisels (47%) was shaped by overall bifacial flaking (Fig. 7.11:2) and relatively few (18%) were shaped by bifacial flaking and polishing (Figs. 7.10:1; 7.11: 1). The remainder (35%) were shaped by partial bifacial and unifacial flaking. Over half (57%) of the roughouts were shaped by partial bifacial and unifacial flaking (Fig. 7.12:1) and the others (43%) by overall bifacial flaking (Fig. 7.12:2). Most of the adzes and chisels were shaped by overall bifacial flaking while polishing was more common for shaping adzes. Partial bifacial flaking and unifacial flaking are commoner among chisels, probably because blade selection for chisel production enabled less intensive investment in shaping the tool. The total absence of polished roughouts and the fact that many of these tools were shaped by partial bifacial or unifacial flaking support the suggestion that roughouts were discarded during early stages of manufacture.

Shape

Most of the adzes are trapezoidal or triangular in shape (56% and 22% respectively, Fig. 7.7). Sixteen percent were shaped as long narrow trapezes (16%, Fig. 7.8) while the original shape of the others (6%) could not be determined. Almost all chisels (94%) are long, narrow and pointed (Fig. 7.11:2) and most of the roughouts are round or rectangular (57%). Some roughouts were shaped as trapezes and triangles (7% and 14% respectively, Fig. 7.12) and it could be argued that most of the roughouts represent early stages of adze manufacture. Less than half of the roughouts are long and narrow, and these could be regarded as early stages of making chisels.

Cross and length sections

Most adzes are plano-convex in length section (94%) and trapezoidal in cross-section (61%). The rest are plano-convex (21%) and triangular in cross-section (18%). Most chisels are plano-convex in length section (88%) while the rest are lenticular. Cross-sections of chisels are varied: triangular (53%), trapezoidal (23.5%), angular (12%) and plano-convex or lenticular (6% each). Length and cross-sections of roughouts are not uniform.

TABLE 7.7: MEASURABLE PARAMETERS OF MAJOR BIFACIAL TOOL TYPES

Measurable parameters	*Adze (n=33)*	*Chisel (n=17)*	*Roughout (n=14)*
Length of whole tools (mm)	71-100 (87.5%), 101-110 (12.5%)	71-100 (100%)	71-100 (90%), 101-110 (10%)
Mean length of whole tools (mm)	77.8 (n=9)	79.7 (n=4)	83.6 (n=10)
Cutting edge thickness (mm.)	3-5 (100%)	3-5 (83%) 6-10 (17%)	3-5 (62.5%) 6-10 (25%) above 11 (12.5%)
Mid thickness (mm)	11-20 (19%) 21-30 (71%) 31-35 (10%)	11-20 (69%) 21-25 (31%)	11-20 (21%) 21-30 (64%) 31-35 (14%)
Mean mid thickness (mm)	24.1 (n=31)	18.3 (n=17)	24.7 (n=14)
Base thickness (mm)	6-10 (36%) 11-15 (32%) 16-20 (23%) above 20 (9%)	6-10 (71%), 11-15 (21%), 16-20 (7%)	6-10 (15%) 11-15 (46%) 16-20 (15%) above 20 (23%)
Cutting edge width (mm)	25-30 (17%) 31-35 (33%) 36-40 (28%) above 40 (22%)	6-10 (43%) 11-15 (43%) 16-20 (14%)	11-15 (20%) 25-30 (20%) 31-35 (20%) 36-40 (20%) above 40 (20%)
Mean cutting edge width (mm)	36 (n=9)	12 (n=4)	32.6 (n=9)
Mid width (mm.)	21-30 (29%) 31-40 (61%) above 41 (10%)	17-20 (37.5%) 21-30 (63%)	21-30 (14%) 31-40 (43%), above 41 (43%)
Base width (mm)	11-20 (59%) 21-30 (41%)	11-20 (92%) 21-25 (8%)	11-20 (15%) 21-30 (69%) 31-40 (15%)
Length/ cutting edge width ratio	1:2.1	1:6.6	1:2.5
Cutting edge width/ mid thickness ratio	1:1.5	1:0.65	1:1.3
Number of bifacial flakings on whole tools	31-40 (44%) 41-60 (44%) 61-70 (11%)	31-40 (25%) 41-60 (50%) 61-70 (25%)	up to 20 (22%) 21-40 (55%) 41-50 (22%)
Number of cross-flakings on whole tools	1-5 (25%) 6-10 (62.5%), above 11 (12.5%)	1-5 (67%) 6-10 (33%)	1-5 (43%) 6-10 (57%)
Number of hinge flakings on whole tools	up to 5 (11%) 6-10 (22%) 11-15 (56%) above 16 (11%)	6-10 (25%) 11-15 (75%)	up to 5 (12.5%) 6-10 (62.5%) 11-15 (25%)
Cutting edge angle (in degrees)	up to 40 (50%) 45-55 (50%)	up to 40 (100%)	up to 40 (29%) 45-55 (71%)
Weight of whole tools (gm)	31-50 (22%) 51-70 (11%) 71-100 (55.5%), above 100 (11%)	21-30 (50%) 31-50 (25%) 51-70 (25%)	21-30 (10%) 31-50 (30%) 51-70 (20%) 71-100 (20%) above 100 (20%)
Mean weight of whole tools (gm)	84 (n=9)	35.5 (n=4)	82.1 (n=9)

Length sections are plano-convex (43%), lenticular (29%), combined (plano-convex and lenticular, 21%) and angular (7%). Cross-sections are lenticular (36%), trapezoidal (21%), plano-convex (21%), triangular (14%) and angular (7%). Plano-convex length and cross-section are very common among adzes and chisels, showing similarities in shaping these two tool types. The non-uniform sections of roughouts indicate that these tools were discarded before reaching an advanced stage in the manufacturing process.

Bifacial ridge shaping

Most of the bifacial ridges of adzes are straight and were meticulously flaked (64%). Only one third of the chisels have straight bifacial ridges (35%) while none of the roughouts were meticulousely shaped.

State of preservation of bifacial tools

Only about one quarter of the adzes (27%) and chisels (23.5%) are whole (Figs. 7.7:2; 7.8:2; 7.11: 1). The rest of the adzes (58%) and chisels (65%) are represented by basal and medial fragments and cutting edge fragments (15%, Figs. 7.7:1, 7.10: 2, and 12%, Fig. 7.10:1 respectively). The state of preservation of the roughouts differs considerably from that of the completed bifacial tools. Most of the roughouts are whole (71%, Fig. 7.12) and broken fragments are relatively rare (mostly basal and medial fragments, 21%). The fact that only a few adzes and chisels are whole could indicate either that these tools were intensively used and therefore broke more often, or alternatively that the large number of broken specimens could be a result of using weak flint with inclusions. The large number of roughouts that were unbroken suggests that they were not finished or used.

Discard patterns of complete bifacial tools

More than half (56%) of the whole adzes were discarded due to cutting edge damage (unintentional flaking, battering and minor fractures, Figs. 7.7:2, 7.8: 2) while 33% were discarded because of unsuccessful repair, mainly failed attempts at resharpening the working edge or reshaping the tool itself by bifacial flaking (Fig. 7.9:1), or for some unknown reason (11%). Two of the four whole chisels were discarded due to cutting edge damage (Fig. 7.11:2) while the other two were discarded beause of unsuccessful repair (Fig. 7.11:1). The majority (80%) of the whole roughouts were discarded because of unsuccessful shaping (Fig. 7.12), mainly due to failing bifacial blows which resulted in hinge or step fractures. The reason for discarding the rest of the roughouts (20%) could not be determined.

It is suggested that at Givʿat ha-Oranim bifacial tools were intensively used as working tools and were discarded mainly after reaching the point where they could not be used effectively. While most completed tools were discarded after use, most roughouts were discarded prior to their use as working tools, mainly because of bifacial production errors.

Table 7.7 presents the measurable parameters of the three major bifacial tool types in the Givʿat ha-Oranim assemblage.

The metric data reveal that adzes and chisels have very similar lengths. Adzes are much wider and thicker than chisels, and the major difference is in the cutting edge width which is three times larger for adzes than for chisels. The ratio of length to cutting edge width emphasizes this difference. The ratio of cutting edge width to mid-thickness indicates that the adzes are relatively wide and thick as opposed to the narrow and thin chisels. The roughouts are generally similar in metrics to the completed adzes, but a few chisels in the early stages of manufacture are present as well.

Working edges are relatively sharp. All cutting edges of chisels, as well as half of the adzes, are sharper than 40^{o}. Adzes and chisels are different in terms of weight. Adzes are relatively heavy tools and weigh, on average, more than 80 gm, at least twice as heavy as chisels.

The bifacial tool category of Givʿat ha-Oranim is clearly dominated by adzes and chisels. Axes are very rare and roughouts are relatively abundant. Bifacial tools at the site were made of raw material that was far from ideal. Adzes, chisels and roughouts were made either of hiqh quality, non-homogeneous flint with inclusions or of homogeneous raw material of medium to low quality. Thus the tools are of limited durability and tend to break during intensive use. Most of the completed bifacial tools, adzes and chisels broke and lost their cutting edges.

Many adzes and chisels were shaped by bifacial flaking and polishing, and it seems that originally many of the broken or damaged bifacial tools were polished as well. None of the bifacial roughouts were polished and in most cases the working edges of the preforms were not shaped prior to their discard. Length sections of adzes and chisels are very similar and may indicate similarities in manufacturing techniques, hafting and use. Most of the completed bifacial tools are broken and only a few whole adzes and chisels were found. Almost all of these tools were discarded as non-usable due to cutting edge damage or following unsuccessful repair. The abundance of broken and damaged bifacial tools supports the suggestion that at this site bifacial tools were used intensively in massive crafts and were discarded after a few cycles of use and repair. Bifacial roughouts, on the other hand, are mostly unbroken and were discarded before use due to failure during the manufacturing process. It appears that the common use of non-homogeneous raw material resulted in many bifacial tool manufacturing errors, and therefore many roughouts were discarded at the site.

Many bifacial tools were intensively repaired and resharpened. Bifacial tools were re-flaked after they were polished and several polished surfaces were removed. Several flakes and blades with polish on their dorsal face were recovered (Figs. 7.10:4; 7.11:3) and these are most probably the by-products of recycling and resharpening bifacial tools (Barkai 1999). A single broken adze was trasformed into a core after it went out of use as a bifacial tool. It seems reasonable to suggest that the intensive maintenance of bifacial tools resulted from the use of non-homogeneous flint that made the tools less damage-proof and required constant treatment. It should be noted that nine bifacial roughouts were found in a single locus (Locus 1001 in Cave 1779). This locus could be interpreted as a lithic workshop or as a dump area of such workshop.

A sample of adzes and chisels was studied in order to identify the function of these tools (Chapter 8). Wood polish was present on most of them and it could be concluded that the Chalcolithic bifacial tools from Givʿat ha-Oranim were mainly used as woodworking tools. Both adzes and chisels were used in processing wood, but while chisels were used mainly in delicate and light woodworking, adzes were mainly used in heavier or rougher woodworking activities such as wood chopping and tree felling. Most adzes are heavily damaged and some were clearly broken during use. It must be stated that some of the adzes show both evidence of massive and light woodworking and thus it could be concluded that adzes were used for different and varied wood processing crafts. Two bifacial tools, classified here as roughouts, were also studied for use wear traces and revealed no such signs. The results of the use-wear studies supports the typological classification of the different bifacial tool types and adds a functional dimension to bifacial tool typology. In general terms the use-wear study clearly indicates that a sophisticated woodworking industry operated at Givʿat ha-Oranim and this industry used several bifacial tool types intended for different stages of wood processing. A major point to be emphasized is the multi-functional character of the adze, being a sophisticated and versatile woodworking tool.

VARIA

These comprise complete retouched items that do not fit any of the above categories. Among them are a single fragmentary tool and a broken perforated disc (Fig. 3:3). Flint perforated discs are considered one of the hallmarks of the Chalcolithic lithic industry (Noy 1998; Rosen 1997:84-5), although their role in the technological and socio-economical systems is still far from being clear.

SUMMARY

The Chalcolithic lithic assemblage of Givʿat ha-Oranim is clearly divided into two production trajectories. Flakes were the preferred blanks and these were mainly detached from non-standardized cores with more than one striking platform. Blades were produced in relatively small numbers and these were struck from well shaped and wellmaintained cores. The lithic industry may therefore be characterized as flake dominated with a specific, seperate trajectory aimed at blade production.

In general terms, disregarding blade and bladelet production, it may be regarded as basically opportunistic, non-standardized and non-meticulous. The blade production trajectory, on the other hand, is mostly carefully prepared and well controlled. This technological dichotomy is reflected in the tool assemblage as well. Most of the tools are multi-purpose, unstandardized *ad hoc* tools (such as retouched blanks, notches and denticulates, etc.) while a restricted part of the tools are specific, standardized shaped items (such as sickle blades and bifacial tools). This division accords with Binford's (1979) curated and expedient tools. All sickle blades and many of the bifacial tools were made of blades and thus a direct correlation is indicated between the blade production trajectory and curated, standardized tools. Sickle blades and bifacial tools from Givʿat ha-Oranim were thoroughly studied and it appears that the Chalcolithic inhabitants of the site chose to invest considerable effort in order to produce standardized and curated tools in order to perform two important tasks - plant harvesting and woodworking. While most of the *ad hoc* expedient tools were probably used in domestic daily activities, sickle blades and bifacial tools were used for specific tasks of major importance in the Chalcolithic economy. The Givʿat ha-Oranim lithic assemblage thus provides a great deal of useful information about the daily activities of the site's inhabitants and the technological and economic conventions of Chalcolithic times.

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