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Karabi Tamchin: Lithic Assemblages from Selected Levels

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This chapter describes the lithic assemblages recovered from four levels of Karabi Tamchin during excavations at the site between 1999 and 2001. The lithic material of Level II/2 and Level III displays generally similar technological and typological patterns and can be attributed to the Western Crimean Mousterian. Level IV/2 and Level V display similarities in their technological and typological patterns and can be attributed to the Crimean Micoquian. Despite the difference in the lithic traditions of the two groups, all assemblages exhibit the same type of occupation and raw material resource exploitation.

Basic Assemblage Patterning

In general, stone artifact assemblages from Karabi Tamchin are divided into six major categories: core-like pieces, flakes, blades, tools, and debris (chunks and chips) (Table 20-1). The category core-like pieces includes cores, pre-cores, and fragments of broken cores. The flakes and blades are debitage, without traces of secondary treatment. The tools include regularly retouched unifacial and bifacial implements, broken fragments of tools, and irregularly retouched pieces. Chunks are broken pieces and small fragments of unidentifiable debitage. Chips are debitage less than 29 mm in maximum dimension. The use of screens during excavations resulted in the recovery of even the smallest artifacts. As a result, the vast majority of artifacts recovered in each assemblage were chips. Most chips are too small to study attributes such as platform characteristics, scar patterns, shapes, etc. Chips in each level (Table 20-2) are subdivided according to their maximum dimensions into three intervals: large (with maximum dimensions between 29.9 and 20.0 mm), medium (19.9 mm to 10.0 mm), and small (less than 10.0 mm). It is impossible to know which chips in each metric interval could have come from tool retouch and which chips could have come from core reduction. Although chips, chunks, and unidentifiable pieces of debitage are listed under debris, some chips and chunks might have been used as blanks for tool production.

The essential counts of cores, blades, flakes, and tools show both distinctions and similarities between the discussed assemblages (Table 20-1). In the Level II/2 assemblage, cores are few, debitage (blades plus flakes) represents 41.7%, while more than half of the artifacts are tools. In the Level III assemblage, cores, flakes, blades, and tools occur in about the same proportions as in uppermost level. The same is true for Levels IV/2 and V, except for a lower percentage of blades and a higher percentage of tools.

Based on essential counts, the assemblages of Karabi Tamchin might be divided in two groups. The first group includes the assemblages of Level II/2 and Level III, while the other group includes the assemblages of

TABLE 20-1
Karabi Tamchin artifact totals

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
	N	%	*N*	%	*N*	%	*N*	%
Core-like pieces	4	3.9	5	4.2	3	2.5	–	–
Blades	14	13.6	13	10.9	9	7.4	16	7.4
Flakes	29	28.1	36	30.3	28	22.9	56	26.1
Tools	56	54.4	65	54.6	82	67.2	143	66.5
Chips	849	–	1,669	–	4,749	–	12,872	–
Chunks & unidentifiable debitage	76	–	37	–	47	–	133	–
Total	1,028	100	1,825	100	4,918	100	13,220	100

Level IV/2 and Level V. These groups are characterized by different proportions of large, medium, and small chips (Table 20-2). In Level II/2 and Level III, small and medium chips are more or less equally represented, while large chips account for 14.1% and 8.7 % of all chips. In contrast, in Level IV/2 and Level V, the majority of chips are small, while large and medium sized chips occur in smaller proportions than they do in the assemblages of Level II/2 and Level III (Table 20-2).

TABLE 20-2
Karabi Tamchin chip dimensions in millimeters

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
	N	%	*N*	%	*N*	%	*N*	%
20–29	120	14.1	146	8.7	126	2.7	232	1.8
10–19	436	51.4	752	45.1	1,221	25.7	2,984	23.2
< 10	293	34.5	771	46.2	3,402	71.6	9,656	75.0
Total	849	100	1,669	100	4,749	100	12,872	100

Raw Material Availability and Raw Material Selection

The Internal and External Ridges of the Crimean Mountain, formed of Cretaceous and Paleogene rocks, are characterized by rich flint sources, which were used as the main raw material sources during the whole of the Stone Age. Flint outcrops, however, are totally absent within the Main Ridge of Crimean Mountains, which are formed mainly of Jurassic and Triassic rocks. The area of the low plateau of Karabi Yaila, where Karabi Tamchin is situated, is no exception, and flint outcrops are absent there. A single type of local material—chert nodules—is useful for stone tool production and it is found in Jurassic deposits. Nevertheless, the majority of stone artifacts at Karabi Tamchin were made on a fine-grained grey/dark grey flint, which, when patinated, becomes whitish-grey (Table 20-3). The closest sources of grey flint with such characteristics are situated 25–30 km north of the site.

The flint raw material was subdivided according to degree of patination into four groups: (1) dark grey flint, unpatinated; (2) grey flint with light patina; (3) dark grey flint with green patina; (4) deeply patinated whitish flint. Other raw materials used at Karabi Tamchin are the local coarse-grained cherts that included three types: yellow, grey, brown. Such local chert nodules are sometimes seen at the bottom of the Tamchin River Valley, as well as on slopes under the Jurassic escarpment.

In Level II/2, almost all cores, flakes, blades, and tools were made on flint (Table 20-3). The local cherts are not represented by primary flaking or in the tool assemblage. There is a single flake of the local yellow chert. Unpatinated flint artifacts are absent in this level; most have a light patinated surface. There is one denticulate tool made on a flake of dark grey flint with a green patina. It should be noted that the retouched edge of the tool is not patinated and looks fresher than the other surfaces of the blank. Probably, this blank was reutilized and is not connected with debitage produced on-site.

Almost all artifacts are made on flint in Level III (Table 20-3). A simple retouched flake and a broken tool have no traces of patina, while about two-thirds are lightly patinated. The rest are deeply patinated. Local chert accounts for 5% of the artifacts: 2 simple retouched pieces and 3 tools, all made on yellow chert, plus 1 core on grey chert.

Although the vast majority of artifacts from Level IV/2 are flint (Table 20-3), the percentage of artifacts made on local cherts (11.7%) in this level is much larger than in the assemblages of Level II/2 and Level III. There are 7 pieces (one core, one flake, four retouched pieces, and one tool) made on yellow chert, 6 pieces (one blade, two flakes, one retouched piece, and two tools) made on grey chert, and 1 tool made

TABLE 20-3
Karabi Tamchin: distribution of artifacts by raw material types†

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
	N	%	*N*	%	*N*	%	*N*	%
Flint, grey with light patina	76	73.8	75	63	59	49.3	124	58.5
Flint, grey with deep patina	25	24.4	36	30.3	39	32.5	48	22.7
Flint, dark grey	–	–	2	1.7	7	5.8	19	9.0
Flint, dark grey with green patina	1	0.9	–	–	1	0.8	–	–
Chert, yellow	1	0.9	5	4.2	7	5.8	17	8.0
Chert, grey	–	–	1	0.8	6	5.0	2	0.9
Chert, brown	–	–	0	–	1	0.8	2	0.9
Total	103	100	119	100	120	100	212	100

†does not include chips or chunks

on brown chert. Again, most artifacts are patinated, although they are rather evenly divided between light and heavy patination. One simple concave scraper was made on a dark grey flint flake with a green patina. The retouched edge of the tool has traces of secondary reutilization.

Almost all artifacts from Level V are flint, although 10% are on local chert (Table 20-3). While 9% of the artifacts are unpatinated, the rest are patinated, with light patination dominating. It should be noted that a significant part of the heavily patinated pieces (about 40%) are yellowish in color, a result of specific surface chemical modification in the brecciated sediment. Artifacts made on local raw materials are more common than in the upper levels (Table 20-3).

Thus, all the assemblages are mainly flint, which might have been transported to the site from outcrops situated some 25–30 km from Karabi Tamchin. The flint artifacts in Levels II/2, III, and IV/2 include all artifact categories: core-like pieces, debitage, tools, and waste. At the same time, core-like pieces are absent in the assemblage of Level V. The utilization of local cherts is minor in all assemblages. Apparently, the assemblages of Levels II/2 and III included an occasional piece unconnected with on-site primary flaking. There is one yellow chert flake in Level II/2, and two tools on yellow chert and one core on grey chert in Level III, but no associated debitage. On the other hand, the assemblages of Levels IV/2 and V indicate a wider use of local chert raw materials. In Level IV/2 there are pieces of debitage, a core, and tools made on yellow chert, debitage and tools made on grey chert, and one tool made on brown chert. Probably, during the occupation of Level IV/2, yellow and grey cherts were flaked on-site, but the tool on brown chert was imported. The assemblage of Level V consists of debitage and tools made on yellow chert, while grey and brown cherts are represented only by tools. Evidently, yellow chert was flaked on-site, while the tools on grey and brown cherts were imported.

Patterns of Core Reduction

There are few core-like pieces in Levels II/2, III, and IV/2, and none in Level V (Table 20-1). The majority of cores are small, exhausted pieces, without clear patterning. On the other hand, there are major differences between these assemblages in the range and kind of reduction patterns used. While some Levallois blanks and tools made on Levallois blanks were recovered from Levels II/2 and III, no indication of Levallois flaking was found in Levels IV/2 and V.

LEVEL II/2

There are three complete and one broken flint cores in the assemblage of Level II/2. The broken core was made on a flake, while the complete cores were made on flint plaquettes.

The largest core (61 mm long, 54 mm wide, and 10 mm thick) has a semi-ovoid flaking surface and a series of unidirectional/parallel removals from the main platform. The core has one flaking surface, one main faceted platform, and three supplementary faceted platforms, two lateral edges and one distal. The back of the core is flat and 75% cortex covered.

One sub-rectangular core (39 mm long, 30 mm wide, and 20 mm thick) has one flaking surface with unidirectional removals from one main faceted platform (Figure 20-1: *4*) and one lateral supplementary faceted platform. The main scar on the flaking surface

is 34 mm long and 22 mm wide. The back is irregular and half covered by cortex.

An ovoid core (33 mm long, 34 mm wide, and 22 mm thick) also has one flaking surface with a removal 32 mm long and 21 mm wide from a single main faceted platform. The core has one lateral supplementary faceted platform. The back is convex, with no cortex.

There is one small broken core (30 mm long, 31 mm wide, and 12 mm thick). The core has one flaking surface and one main faceted platform (Figure 20-1: *3*). There are no supplementary platforms. The largest scar on the flaking surface is 30 mm long and 22 mm wide. The back is broken and has some cortex.

Level III

Four cores and one pre-core were found in Level III. The pre-core is made on a flint plaquette 40 mm long, 42 mm wide, and 11 mm thick. It has a single flaking surface, a main faceted platform, and a lateral faceted supplementary platform (Figure 20-1: *2*). Obviously, only a single primary flake (30 mm × 24 mm) was removed from the flaking surface. After that, the lateral supplementary platform was prepared and a number of chips were taken off to form the lateral convexity of the flaking surface for the next removal. The back is flat and completely covered by cortex.

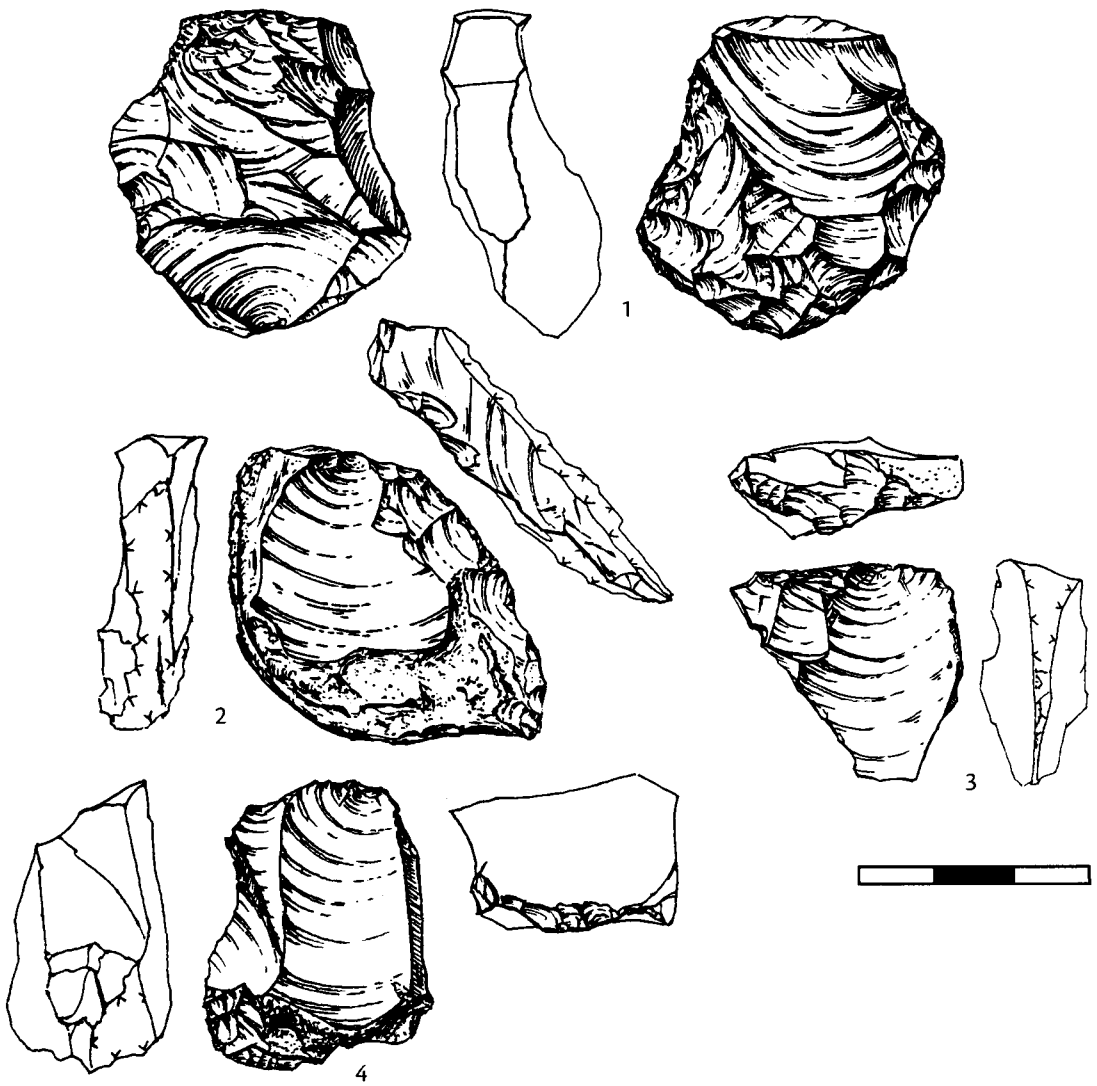

Figure 20-1—Karabi Tamchin Level II/2 (3, 4) and Level III (1, 2) core-like pieces: *1*–bidirectional opposed platform core with lateral supplementary platforms; *2*–pre-core; *3*, *4*–unidirectional cores with lateral supplementary platforms.

A flint parallel core (39 mm long, 42 mm wide, and 17 mm thick) has one rectangular flaking surface, one main faceted platform, and two supplementary faceted platforms (Figure 20-1: *1*). Scars of three removals are visible on the flaking surface, the largest of which is 39 mm long and 20 mm wide. There are two lateral supplementary platforms and one distal platform. The back is irregular and more than 50% of it is covered by cortex.

A convergent core (55 mm long, 52 mm wide, and 18 mm thick) on a grey chert flake has a sub-triangular flaking surface, one main faceted platform, and two supplementary faceted platforms (Figure 20-2: *2*). Scars of two successful removals and a series of unsuccessful removals are visible on the flaking surface, the largest of which is 48 mm long and 25 mm wide. There are two lateral supplementary platforms. The back is convex, without any traces of cortex.

A bidirectional core (44 mm long, 43 mm wide, and 20 mm thick) was made on a flint nodule or thick flake (Figure 20-2: *1*). This core exhibits two bidirectional removals on one flaking surface, one platform that is faceted, and another that is unfaceted. The largest scar is 17 mm long and 32 mm wide. A single lateral supplementary platform is faceted. The back is broken.

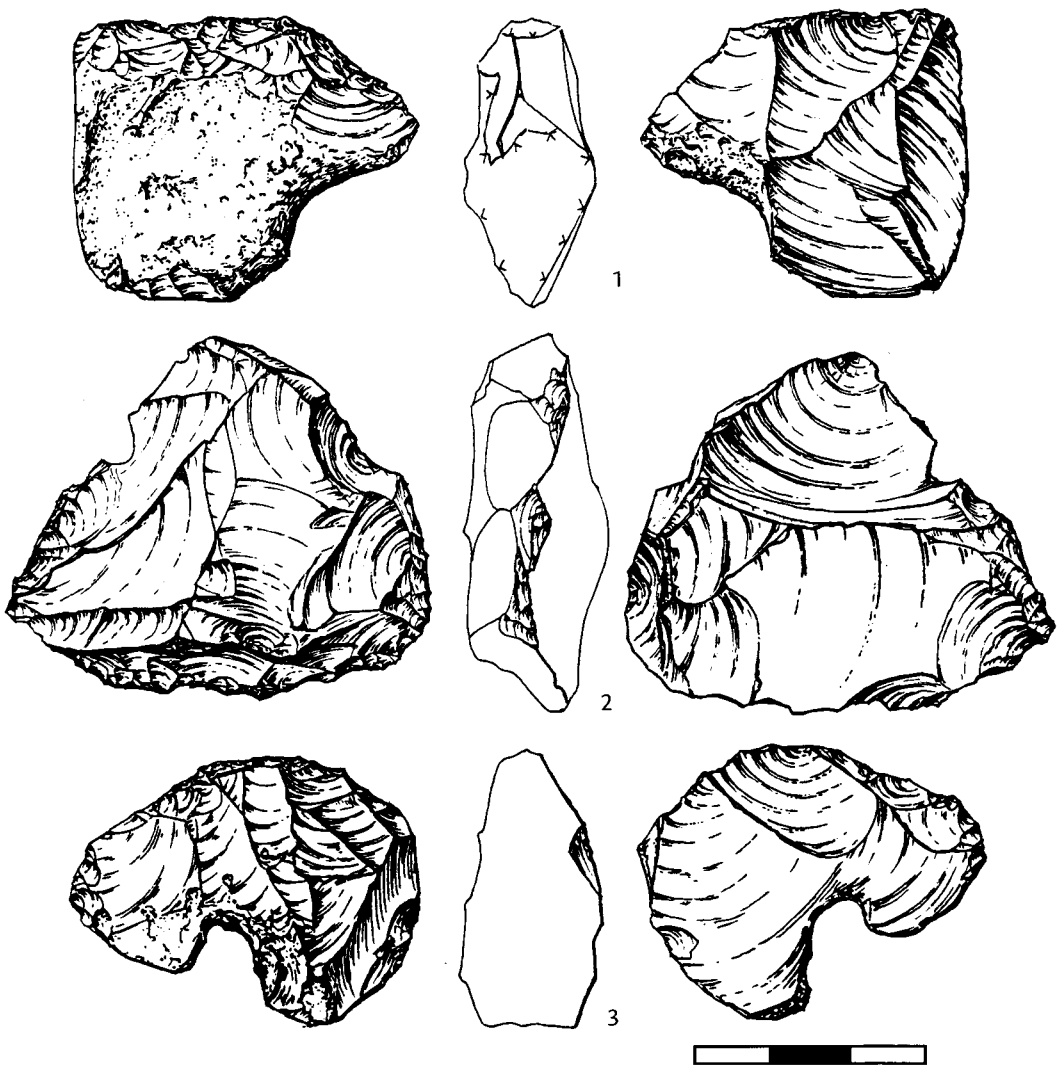

Figure 20-2—Karabi Tamchin Level III core-like pieces: *1*, *3*–unidirectional cores with lateral supplementary platforms; *2*–convergent core with supplementary platforms.

The broken core is a relatively large (35 mm long, 43 mm wide, and 15 mm thick) fragment on a flake (Figure 20-2: *3*). This core has a main faceted platform, a lateral supplementary faceted platform, and a remnant of the flaking surface. Traces of two removals remain on the flaking surface. The largest is 34 mm long and 41 mm wide. The back of the core is convex and partially cortex covered.

Level IV/2

There are three exhausted cores in Level IV/2: two are multi-platform and one is bifacial bi-parallel. One multi-platform core with three main platforms and one flaking surface is on local yellow chert, 39 mm long, 30 mm wide, and 16 mm thick. Two of the platforms are faceted and one is not. The flaking surface is rectangular and there are scars of four removals, the largest of which is 27 mm long and 11 mm wide. The back is flat and without cortex.

Another multi-platform flint core with three main platforms and one rectangular flaking surface is 30 mm long, 24 mm wide, and 13 mm thick. Two of the platforms are unfaceted and one is faceted. Scars of two removals are visible, the largest of which is 21 mm long and 16 mm wide. The back is flat and without cortex.

The bifacial flint core (48 mm long, 33 mm wide, and 16 mm thick) has two main platforms and two opposing rectangular flaking surfaces. The main platforms, both unfaceted, are at the basal part of core, but each is connected with its own surface. Obviously, the core was reutilized. The first stage of core reduction saw a number of light convergent removals, the largest of which is 40 mm long and 12 mm wide. After that, the platform of the core was re-made and prepared for the exploitation of the opposite flaking surface. Two removals were struck from that surface, the largest of which is 35 mm long and 30 mm wide.

Thus, the assemblages of Levels II/2 and III contain unidirectional and bidirectional cores with lateral/distal convexities created from supplementary platforms. These cores are not Levallois in the typological sense, but might be expected from a Levallois method during the last stages of core reduction. Obviously, the core reduction strategy in Levels II/2 and III has analogies to the technologies of Western Crimean Mousterian, where the Levallois method was used.

On the other hand, cores from Level IV/2 do not have supplementary platforms. Two of these are multi-platform and one is bifacial bi-parallel with two flaking surfaces. Such cores are associated with ad hoc technologies that are common in the Crimean Micoquian.

Blank Variability

The specific setting of Karabi Tamchin in the mountainous region relatively far from quality flint sources suggests that artifact production in all occupation levels mainly depended upon imported raw materials. The presence of cores and debitage permit, without any question, the supposition that primary flaking of imported raw materials took place on-site. On other hand, the very high proportions of tools in each assemblage may indicate that some tools were produced off-site. This can be investigated by an analysis of blanks recovered at Karabi Tamchin.

The category of blanks includes debitage without traces of secondary treatment, as well as flake and blade tools. Excluded from blank analyses are bifacial tools, cores, chunks, chips, unidentifiable debitage, and unidentifiable tool fragments, although some of them could have been used as blanks for tool production.

All the assemblages here are too small to subdivide blanks into flakes, blades, and primary pieces for attribute analyses. Moreover, a considerable number of blanks in each assemblage are broken. Therefore, the following discussions of blank morphology are based on combined blade/flake samples.

Blanks potentially have many attributes, but the most important are the dimensions, scar pattern, cortex, shape, striking platform, lateral, and distal profiles. Each blank assemblage has been subdivided into debitage, retouched pieces, and unifacial tools.

There are two different assemblage groups at Karabi Tamchin: assemblages of Levels II/2 and III are Western Crimean Mousterian, while the assemblages of Levels IV/2 and V are Crimean Micoquian. Thus, focus will be placed on the differences and similarities of these groups.

Blank Composition

Although there are twice as many flakes as blades in the debitage of Level II/2 (Table 20-1), there are five times as many flake tools as blade tools. Among unifacial tool blanks that could be identified, there is one denticulate made on a core trimming flake: it is a by-product of tool re-sharpening, potentially unconnected with primary flaking. The total number of blanks includes 21 blades and 63 flakes (Ilam = 25.0).

There are almost three times as many flakes as blades in the debitage of Level III (Table 20-1), while there are 5 times as many identifiable flake tool blanks as blade tool blanks. Thus, in total, there are 20 blade blanks and 72 flake blanks (Ilam = 21.7).

There are three times as many flakes as blades among the debitage of Level IV/2 (Table 20-1) and seven times as many identifiable flake tool blanks as blade tools blanks. Thus, in total, there are 14 blade blanks and 63 flake blanks (Ilam = 18.2).

Combined, there are three and a half times more flakes than blades among the debitage for the two upper levels (Table 20-1), and five times as many identifiable flake tool blanks as blade tool blanks. In total, there are 26 blades and 99 flakes (Ilam = 20.8).

The assemblages of Level IV/2 and V have relatively low percentages of blades and among them are trimming pieces—by-products of the reshaping and thinning of bifacial tools. These trimming blanks include 1 unretouched trimming blade, 2 unifacial tools made on small chip-sized blanks from Level IV/2, 2 trimming blades, 3 trimming flakes, and 1 tool made on a trimming flake from Level V. In addition, 7 blade blanks from Level IV/2 and 16 blade blanks from Level V are distal fragments and some of these could be broken trimming elements.

Shape Characteristics

Several shape attributes were recorded for the blank assemblages: blank shape, blank profile, and profile at distal end (Table 20-4). Although Levels II/2 and III belong to the Western Crimean Mousterian and Levels IV/2 and V are Crimean Micoquian, there are few differences between them in these attributes. Irregular shapes always dominate, followed by expanding and then rectangular. Other shapes occur sporadically, although parallel are more characteristic of the upper two levels than of the lower two (Table 20-4). The same pattern is true for lateral profiles, where there are no significant differences in types from level to level. Incurvate always dominates, usually followed by twisted and then flat. As expected, convex profiles are rare (Table 20-4). For distal profiles, there does appear to be a difference between the upper and lower assemblages. Hinged extremities are more common in Levels II/2 and III, while blunt extremities are more common in Levels IV/2 and V. Of course, in all assemblages, feathering is very common, if not dominant (Table 20-4).

Dorsal Scar Patterns

The large numbers of recognized dorsal scar patterns notwithstanding, only two types occur with high frequencies in all assemblages: unidirectional and unidirectional-crossed. Convergent and three-directional also occur regularly in all assemblages but in lower proportions (Table 20-5). Pieces with crested and *débordant* scar patterns, even combined, are few, but there is reason to think that those blanks are not connected with core reduction strategies in Levels IV/2 and V. They might have come from the rejuvenation

Table 20-4
Karabi Tamchin blank shapes and profiles

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
Shapes	*N*	%	*N*	%	*N*	%	*N*	%
Rectangular	3	6.1	9	14.5	4	7.5	9	12.0
Expending	13	26.5	21	33.8	26	49.1	20	26.7
Triangular	4	8.2	4	6.5	4	7.5	4	5.3
Crescent	1	2.0	4	6.5	1	1.9	–	–
Ovoid	1	2.0	1	1.6	–	–	–	–
Parallel	5	10.2	4	6.5	1	1.9	3	4.0
Diagonal	4	8.2	1	1.6	–	–	3	4.0
Irregular	18	36.8	18	29	17	32.1	36	48.0
Total	49	100	62	100	53	100	75	100
Lateral Profiles								
Flat	15	20.8	12	14.8	11	16.7	29	26.9
Convex	5	6.9	10	12.4	6	9.1	2	1.8
Incurvate	39	54.2	36	44.4	33	50.0	48	44.4
Twisted	13	18.1	23	28.4	16	24.2	29	26.9
Total	72	100	81	100	66	100	108	100
Distal Profiles								
Feathering	18	38.3	20	37.0	16	31.4	37	52.2
Hinged	19	40.4	25	46.3	16	31.4	17	23.9
Blunt	9	19.2	8	14.8	17	33.3	15	21.1
Overpassed	1	2.1	1	1.9	2	3.9	2	2.8
Total	47	100	54	100	51	100	71	100

Table 20-5
Karabi Tamchin blank dorsal scar patterns

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
Scar Patterns	*N*	%	*N*	%	*N*	%	*N*	%
Unidirectional	15	21.7	17	26.2	14	23.7	21	25.0
Convergent	8	11.6	6	9.2	9	15.3	6	7.1
Bidirectional	5	7.3	3	4.6	9	15.3	14	16.7
Unidirect.-crossed	20	29.0	19	29.2	15	25.4	23	27.4
3-directional	8	11.6	10	15.4	4	6.7	11	13.1
Radial	1	1.4	–	–	–	–	1	1.2
Primary	5	7.3	7	10.8	2	3.4	5	5.9
Crested	1	1.4	–	–	2	3.4	1	1.2
Débordant	4	5.8	3	4.6	3	5.1	1	1.2
Irregular	2	2.9	–	–	1	1.7	1	1.2
Total	69	100	65	100	59	100	84	100
Cortex								
None	44	56.4	43	60.6	32	56.1	51	57.9
<25%	17	21.8	13	18.3	11	19.3	20	22.7
25–50%	9	11.5	6	8.5	9	15.8	8	9.1
50–75%	3	3.9	2	2.8	3	5.3	4	4.6
75–100%	5	6.4	7	9.8	2	3.5	5	5.7
Total	78	100	71	100	57	100	88	100

of bifacial tool edges. Moreover, one of the *débordant* blades from Level IV/2 is made on a greenish patinated piece.

The percentage of cortex on blanks is quite consistent, although blanks with more than 75% cortex are more common (yet still not numerous) in the Western Crimean Mousterian than in the Crimean Micoquian assemblages (Table 20-5).

Platform Characteristics

Observations about platform characteristics relate to both striking platform preparation and whether or not blanks have lipping at the intersection of the platform and the ventral surface. For an individual artifact this will not provide unequivocal evidence for hard hammer versus soft hammer percussion, but for the assemblage overall, the dominance of lipping or its absence will indicate the probable typical mode of detachment (Marks and Monigal 1998:134).

The assemblages of Levels II/2 and III are characterized by high percentages of faceted platforms, compared to Levels IV/2 and V (Table 20-6). The latter levels are strikingly different from the upper ones in their moderate presence of cortical platforms (virtually lacking in the upper levels) and in a greater occurrence of unfaceted platforms.

Most of the prepared platforms are multiple faceted. Among those in the upper levels, there is a series of flakes that should be expected from Levallois technology. Such blanks have massive faceted platforms, unidirectional-crossed or 3-directional scar patterns, flat or slightly incurvate lateral profiles, and elongated shapes. Obviously, blanks with such characteristics could come from the exploitation of cores with supplementary platforms, which predominates in Levels II/2 and III. Typologically, Level II/2 has 3 Levallois blanks: a blade, a tool on blade, and a simple retouched flake. Four Levallois blanks were recovered in Level III: a flake, a retouched flake, a tool on an elongated flake, and a tool on blade. Moreover, there are several *débordant* blanks in each of these levels (3 in Level II/2 and 4 in Level III) that also are common for Levallois technology. As expected, the indices of platform preparation are high (Table 20-6).

The pattern of Levels IV/2 and V with a high proportion of unfaceted platforms is related to the absence of Levallois technology in those levels. Again, as expected, this is reflected in lower faceting indices (Table 20-6).

Table 20-6
Karabi Tamchin blank platform preparation and lipping

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
Platform type	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Cortex	1	2.0	–	–	5	13.1	6	10.2
Plain	11	22.5	16	30.8	12	31.6	30	50.8
Dihedral	1	2.0	6	11.5	2	5.3	9	15.3
Polyhedral	2	4.1	2	3.9	7	18.4	4	6.8
Multiple faceted	34	69.4	28	53.8	12	31.6	10	16.9
Total	49	100	52	100	38	100	59	100
Lipping								
Not lipped	45	91.8	48	92.3	33	86.8	49	83.1
Lipped	1	2.1	–	–	2	5.3	4	6.8
Semi-lipped	3	6.1	4	7.7	3	7.9	6	10.1
Total	49	100	52	100	38	100	59	100
IF large	75.5		69.2		55.3		39	
IF strict	69.4		53.8		31.6		16.9	

Blank Dimensions and Blank Selection

The majority of blanks recovered in the assemblages of Karabi Tamchin are small and only a few pieces in each level had maximum dimensions over 50 mm (Table 20-7). In addition, a significant number of blanks from each level are transverse flakes, so these were considered to be a separate group, along with regular flakes and blades (Table 20-7), in order to better understand and describe the differences between blank production and blank selection for tool manufacture.

The average dimensions of the debitage types are very similar for all assemblages. A single exception is the low average thickness for blades in Level III, but this is based on a sample of only 4 blades, 2 of which were long and relatively thin.

The average dimensions of retouched pieces and unifacial tools are greater for blade and flake tool blanks than for the debitage samples in each assemblage (Table 20-7). The mean dimensions of transverse flake blanks, however, are the same as for the debitage. Level II/2 has a series of large tools, among which is a retouched blade 87 mm long, a retouched flake 89 mm long, and a double scraper on a blade 72 mm long. Such large tools do not occur in the other levels. For instance, the largest tool from Level III is a simple scraper made on a blade 54 mm long, the largest tool from Level IV/2 is a convergent scraper on a flake 59 mm long, and the largest tool from Level V is a simple scraper on a flake 62 mm long.

It might be expected that blank selection for tool production would have given preference to some attribute discussed above. As shown by the comparative investigations, there are no significant differences among the proportional occurrences of debitage, retouched pieces, and unifacial tools in the majority of blank attributes. Even these few differences may be unimportant when the possible effects of the small samples from each level are taken into account.

All Karabi Tamchin assemblages have a high percentage of tools that obviously resulted from a paucity

TABLE 20-7
Karabi Tamchin average dimensions of debitage, retouched pieces, and tools†

	Level II/2			*Level III*			*Level IV/2*			*Level V*		
Debitage	*Blades*	*Flakes*	*Transv. Flakes*	*Blades*	*Flakes*	*Transv. Flakes*	*Blades*	*Flakes*	*Transv. Flakes*	*Blades*	*Flakes*	*Transv. Flakes*
Length, mm	37.7	32.8	21.3	37.0	34.9	21.9	37.2	34.7	23.9	40.3	32.7	25.5
Width, mm	16.9	20.2	32.4	15.0	24.0	32.5	15.0	25.6	32.8	17.0	21.8	36.8
Thickness, mm	6.0	6.7	9.1	3.5	6.6	6.0	6.2	6.4	8.2	4.9	5.7	7.7
L/W	2.2	1.6	0.7	2.5	1.5	0.7	2.5	1.4	0.7	2.4	1.5	0.7
W/L	0.4	0.6	1.5	0.4	0.7	1.5	0.4	0.7	1.4	0.4	0.7	1.4
T/L*100, %	15.9	20.3	42.9	9.5	19.0	27.4	16.7	18.4	34.2	12.1	17.4	30.1
T/W*100, %	35.6	33.0	28.2	23.3	27.6	18.5	41.3	25.0	24.9	28.7	26.1	20.8
Retouched pieces												
Length, mm	64.5	44.4	23.0	45.5	37.5	22.0	38.0	33.4	23.5	44.0	36.6	21.0
Width, mm	27.5	28.4	35.0	18.5	28.5	38.0	17.0	21.5	31.0	18.3	27.0	36.0
Thickness, mm	9.0	6.6	7.0	6.5	6.0	7.0	7.0	6.9	7.0	5.7	8.4	5.0
L/W	2.3	1.6	0.7	2.5	1.3	0.6	2.2	1.6	0.8	2.4	1.4	0.6
W/L	0.4	0.6	1.5	0.4	0.8	1.7	0.4	0.6	1.3	0.4	0.7	1.7
T/L*100, %	14.0	14.9	30.4	14.3	16.0	31.8	18.4	20.6	29.8	12.9	23.0	23.8
T/W*100, %	32.7	23.2	20.0	35.1	21.1	18.4	41.2	32.0	22.6	30.9	31.1	13.9
Unifacial tools												
Length, mm	59.3	37.6	27.3	48.0	38.7	23.2	41.7	39.0	36.0	47.2	36.6	24.4
Width, mm	22.0	26.7	32.8	21.7	25.4	35.2	18.7	27.9	45.5	22.2	26.6	36.6
Thickness, mm	8.0	6.7	8.8	6.7	6.7	9.3	8.0	8.7	10.5	6.0	9.5	9.0
L/W	2.7	1.4	0.8	2.2	1.5	0.7	2.2	1.4	0.8	2.1	1.4	0.7
W/L	0.4	0.7	1.2	0.5	0.7	1.5	0.4	0.7	1.3	0.5	0.7	1.5
T/L*100, %	13.5	17.7	32.1	22.6	17.3	40.3	19.2	22.3	29.2	12.7	25.9	36.9
T/W*100, %	36.4	24.9	26.7	41.2	26.4	26.5	42.9	31.2	23.1	27.0	35.6	24.6

†complete pieces only

of raw material. Because of this, the proportional occurrences of most attributes are related to tool characteristics. The analysis of blank variability has shown that in conditions of raw material shortage, blank selection is biased toward the largest available pieces, while other characteristics such as scar pattern, shape, lateral profile, etc., are not decisive factors. All types of blades, flakes, and transversal flakes were widely used as blanks for tool production. The proportional occurrence of tools by blank types (Table 20-8) shows that there are relatively few differences among levels. It seems, in spite of the quite different technologies used to produce blanks in Level II/2–Level III and Level IV/2–Level V, the tool assemblages have a similar pattern of blank selection. On the other hand, morphological differences among blank types did play a secondary role in blank selection. It is obvious that the primary criterion in blank selection for tool production was blank size. The longest edge of blades and regular flakes is the lateral edge, while for transverse flake the longest edge is the distal edge. In this sense, in each assemblage, the division of blanks by their maximum dimensions shows that the larger the blank, the more likely it was used for tool production (Table 20-9). This selective preference for large blanks does not mean that smaller blanks were not also retouched. About half of the blanks measuring 30–49 mm in each level were made into tools. Also, in each level there are tools made on chip-sized blanks (< 30 mm in maximum dimension). On the other hand, an appreciable percentage of tools in each level are invasively retouched and heavy resharpened implements. With each resharpening, the tool became smaller and many of tools do not reflect their original blank dimensions. Thus, many of the chip-dimensioned tools with heavy rejuvenation of their edges might have been much larger before resharpening.

TABLE 20-8
Karabi Tamchin tool assemblages by blank types

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
	N	%	*N*	%	*N*	%	*N*	%
Blades	7	16.7	7	12.7	5	12.5	10	18.9
Regular flakes	30	71.4	41	74.6	31	77.5	37	69.8
Transverse flakes	5	11.9	7	12.7	4	10.0	6	11.3
Total	42	100	55	100	40	100	53	100

TABLE 20-9
Karabi Tamchin blanks grouped by maximum dimension

	Level II/2					*Level III*					*Level IV/2*					*Level V*				
	Debitage	*Retouched pieces*	*Tools*	*Total*		*Debitage*	*Retouched pieces*	*Tools*	*Total*		*Debitage*	*Retouched pieces*	*Tools*	*Total*		*Debitage*	*Retouched pieces*	*Tools*	*Total*	
	N	*N*	*N*	*N*	%	*N*	*N*	*N*	*N*	%	*N*	*N*	*N*	*N*	%	*N*	*N*	*N*	*N*	%
20–29 mm	120	1	3	124	67.0	146	2	3	151	71.9	126	2	3	131	71.6	232	9	9	250	76.2
30–39 mm	21	6	15	42	22.7	31	3	10	44	20.9	22	10	10	42	23.0	35	6	20	61	18.6
40–49 mm	4	4	5	13	7.0	4	3	3	10	4.8	3	1	1	5	2.7	2	1	6	9	2.7
50–59 mm	–	1	1	2	1.1	–	1	3	4	1.9	1	–	4	5	2.7	3	2	2	7	2.1
60–69 mm	–	–	1	1	0.5	1	–	–	1	0.5	–	–	–	–	–	–	–	1	1	0.3
70–79 mm	–	–	1	1	0.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
80–89 mm	–	2	–	2	1.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total	145	14	26	185	100.0	182	9	19	210	100.0	152	13	18	183	100.0	272	18	38	328	100.0

Tool Assemblages

As discussed above, the tool assemblages of Karabi Tamchin have been divided into four groups: bifacial tools, unifacial tools, retouched pieces, and tool fragments. Not all of these tool groups, however, are useful for typological definition.

Most retouched pieces have light or very light marginal retouch: only several edges from each level have irregular scalar retouch. Because retouched pieces exhibit little modification of their edges, it is possible to suggest that most of these retouched pieces were used only briefly and without resharpening. On the other hand, some these could have resulted from natural edge damage, unconnected with human activity.

Tool fragments are mostly broken unifacial tools. These broken tools have different types of retouch but are very small. As such, they provide little typological information and are not useful for assemblage comparisons. Thus, tool fragments and retouched pieces were counted as tools *sensu lato*. They are not included in the restricted type list but are shown as separate categories by retouch surface or position (Table 20-10).

Regular retouched implements, tools *sensu stricto*, include bifacial and unifacial tools that are described according to the typological classification of flint artifacts used previously for investigations of the Western Crimean Middle Paleolithic (Chabai 1998c, 1998d; Chabai and Demidenko 1998; Marks and Monigal 1998; Yevtushenko 1998b).

Bifacial tools were recovered in Levels IV/2 and V, but they were absent in Levels II/2 and III (Table 20-10). Among the bifacial tools, there are only pieces reduced plano-convexly. In general, bifacial tools include only points and scrapers. Taking into account that almost all bifacial tools from Karabi Tamchin are very reduced, however, such a subdivision is unreasonable. Depending upon the number of retouched edges, bifacial tools were divided into simple, convergent, and double. Additional attributes used in the classification of bifacial tools were the presence or absence of other typological elements, such as natural, plain, or faceted backs.

Unifacial tools include continuously retouched implements with dorsal, ventral, alternating, and alternate retouch. These unifacial tools are subdivided into several tool classes, such as points, scrapers, denticulates, notches, endscrapers, and perforators. According to the number of retouched edges, edge shapes, and edge placement, most of the tool classes were subdivided into subsets based on the overall tool shape.

Because of small sample sizes, the percentages of the different unifacial tool classes are only suggestive. The main groups of unifacial tools are points and scrapers, while other tools, such as denticulates, notches, endscrapers, perforators, etc., occur in very small numbers. On the other hand, many of the unifacial tools have both a small size and extensive edge modification, making classification, at times, difficult. For instance, the distinction between points and convergent scrapers is based on the sharpness of the pointed tip, but it is objectively difficult to separate points from convergent scrapers when they are made on small blanks and have heavy invasive retouch. The tools consist of simple with one retouched edge (lateral, transverse, and transverse-oblique), double, and convergent. The correlations of simple, double, and convergent tools reflect the morphological characteristics of the unifacial toolkits (Table 20-11).

TABLE 20-10
Karabi Tamchin, tool assemblages by level (continued on following page)

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Points	*7*	*22.6*	*3*	*10.7*	*4*	*11.4*	*15*	*25.0*
Sub-triangular	2	6.5	–	–	–	–	3	5.0
Crescent	–	–	–	–	–	–	1	1.7
Sub-crescent	–	–	–	–	–	–	1	1.7
Semi-trapezoidal	–	–	–	–	–	–	2	3.3
Amorphous	1	3.2	–	–	–	–	1	1.7
Lateral	1	3.2	1	3.6	–	–	–	–
Tip fragment	3	9.7	2	7.1	4	11.4	7	11.7
Scrapers	*19*	*61.3*	*18*	*64.3*	*26*	*74.3*	*37*	*61.7*
Transverse straight	–	–	–	–	–	–	2	3.3
Transverse convex	1	3.2	2	7.1	–	–	1	1.7
Transverse wavy	–	–	–	–	–	–	1	1.7
Transverse-oblique straight	1	3.2	1	3.6	–	–	1	1.7
Transverse-oblique convex	–	–	–	–	2	5.7	1	1.7
Lateral straight	6	19.4	1	3.6	4	11.4	8	13.3
Lateral convex	–	–	5	17.9	7	20.0	5	8.3
Lateral concave	–	–	–	–	1	2.9	1	1.7
Lateral wavy	–	–	1	3.6	–	–	7	11.7
Double straight	–	–	–	–	1	2.9	1	1.7
Double convex	–	–	1	3.6	–	–	2	3.3
Double wavy	–	–	1	3.6	–	–	–	–
Double straight-convex	2	6.5	–	–	–	–	2	3.3
Double straight-concave	–	–	–	–	1	2.9	–	–
Double convex-concave	1	3.2	–	–	–	–	–	–
Convergent sub-triangular	2	6.5	2	7.1	–	–	1	1.7
Convergent leaf	–	–	1	3.6	–	–	–	–
Convergent sub-crescent	–	–	–	–	–	–	1	1.7
Convergent semi-crescent	–	–	1	3.6	–	–	1	1.7
Convergent sub-rectangular	–	–	–	–	–	–	1	1.7
Convergent semi-rectangular	–	–	–	–	1	2.9	–	–
Convergent sub-trapezoidal	–	–	–	–	–	–	–	–
Convergent semi-trapezoidal	3	9.7	–	–	1	2.9	–	–
Convergent amorphous	1	3.2	–	–	5	14.3	–	–
Convergent tip fragment	2	6.5	2	7.1	3	8.6	1	1.7
Denticulates	*2*	*6.5*	*2*	*7.1*	–	–	*2*	*3.3*
Transverse	–	–	–	–	–	–	1	1.7
Simple	1	3.2	1	3.6	–	–	–	–
Double	1	3.2	1	3.6	–	–	1	1.7
Notches	*2*	*6.5*	*4*	*14.3*	*1*	*2.9*	–	–
Simple lateral	1	3.2	2	7.1	1	2.9	–	–
Simple distal	0	0.0	2	7.1	–	–	–	–
Double distal-lateral	1	3.2	–	–	–	–	–	–
Endscrapers	–	–	*1*	*3.6*	–	–	*1*	*1.7*
Atypical distal	–	–	–	–	–	–	1	1.7
Atypical proximal	–	–	1	3.6	–	–	–	–
Perforators	*1*	*3.2*	–	–	–	–	–	–
Sub-triangular	1	3.2	–	–	–	–	–	–
Bifacial tools	–	–	–	–	*4*	*11.4*	*5*	*8.3*
Simple convex	–	–	–	–	–	–	1	1.7
Leaf-shaped	–	–	–	–	1	2.9	1	1.7
Semi-crescent	–	–	–	–	1	2.9	–	–
Sub-triangular	–	–	–	–	1	2.9	1	1.7
Bifacial, unidentifiable	–	–	–	–	1	2.9	2	3.3
Restricted total	*31*	*100.0*	*28*	*100.0*	*35*	*100.0*	*60*	*100.0*

TABLE 20-10 CONTINUED
Karabi Tamchin tool assemblages by level

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
	N	%	*N*	%	*N*	%	*N*	%
Retouched pieces	*18*		*19*		*27*		*24*	
Lateral	16		15		17		14	
Distal	1		1		2		3	
Proximal	–		–		1		2	
Bilateral	1		3		7		5	
Tool fragments	*7*		*18*		*20*		*59*	
Obversely retouched	7		14		18		53	
Inversely retouched	–		2		–		2	
Alternately retouched	–		2		1		3	
Bifacially retouched	–		–		1		1	
Total	56		65		82		143	

The following types of retouch were recognized: scalar, combined (scalar plus sub-parallel), stepped, marginal, and irregular. Sub-parallel retouch only occurred in combination with scalar retouch. It is important to note that complex tools with two or more working edges (double scrapers, points, and convergent scrapers), as a rule, exhibit different types of retouch and retouch intensity on their working edges. Taking this into account, each edge of the unifacial tools was investigated separately.

Based on the extent of the retouch, tool edges were subdivided into light retouch (1–2 retouched rows), medium retouch (multi-row retouch in strips < 5 mm wide), and heavy retouch (multi-row retouch in strips > 5 mm wide). Retouch angles were subdivided into flat (< 45°), semi-steep (45°–60°), and steep (> 60°). Using a combination of retouch type, width of retouch, and retouch angle, it was possible to divide tools into three grades of exhaustion:

(A) Not exhausted—all working edges have retouch that is light, flat, or semi-steep scalar;
(B) Semi-exhausted—even if one working edge has medium retouch by flat or semi-steep scalar or combined retouch it goes here;
(C) Exhausted—even if one working edge has heavy steep or semi-steep stepped retouch it is considered exhausted.

The results are shown in Table 20-11.

TABLE 20-11
Karabi Tamchin, morphological structure of unifacial tools

	Level II/2					*Level III*					*Level IV/2*					*Level V*				
	A	*B*	*C*	*Total*		*A*	*B*	*C*	*Total*		*A*	*B*	*C*	*Total*		*A*	*B*	*C*	*Total*	
	N	*N*	*N*	*N*	%	*N*	*N*	*N*	*N*	%	*N*	*N*	*N*	*N*	%	*N*	*N*	*N*	*N*	%
Simple	–	–	8	8	30.8	2	6	2	10	47.6	5	7	2	14	46.7	4	15	8	27	51.9
Double	–	3	–	3	11.5	–	1	1	2	9.5	–	–	2	2	6.6	–	3	2	5	9.6
Convergent	3	9	3	15	57.7	2	4	3	9	42.9	1	7	6	14	46.7	–	6	14	20	38.5
Total	3	12	11	26	100	4	11	6	21	100	6	14	10	30	100	4	24	24	52	100

A - not-exhausted tools; B - semi-exhausted tools; C - exhausted tools

LEVEL II/2

The tool assemblage of Level II/2 consists of 31 unifacial tools, 18 retouched pieces, and 7 tool fragments. Bifacial tools are absent (Table 20-10).

Unifacial Tools

The unifacial toolkit for Level II/2 is dominated by scrapers, followed by points (Table 20-10), and all tools are made on flint. With the exception of a single scraper fragment and a perforator, all retouch is dorsal (93.5%).

The two sub-triangular points are made on flakes, one with dorsal basal thinning (Figure 20-3: *1*). The amorphous point is on a blade (Figure 20-3: *2*). The ventrally thinned pointed tip of this tool is situated at the proximal end of the blank. The lateral point is made on a flake and has a retouched lateral edge and

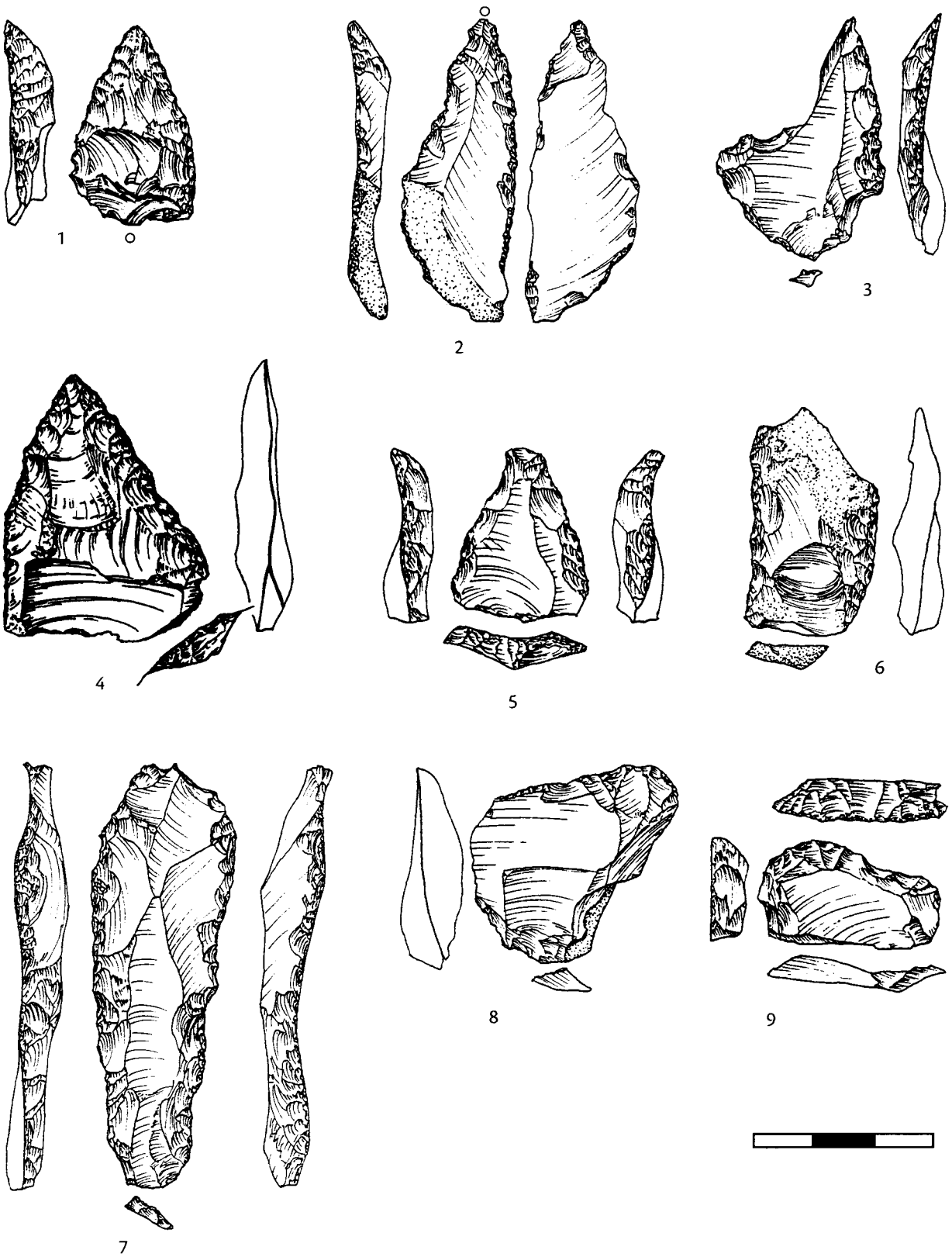

Figure 20-3—Karabi Tamchin Level II/2 tools: *1*–sub-triangular, basally thinned point; *2*–amorphous shaped point; *3*–lateral re-utilized point; *4*–semi-trapezoidal (*déjeté*) scraper; *5*–sub-triangular convergent scraper; *6*–double convex-concave shaped scraper; *7*–double straight-convex shaped scraper; *8*–transversal-oblique straight scraper; *9*–transversal wavy scraper.

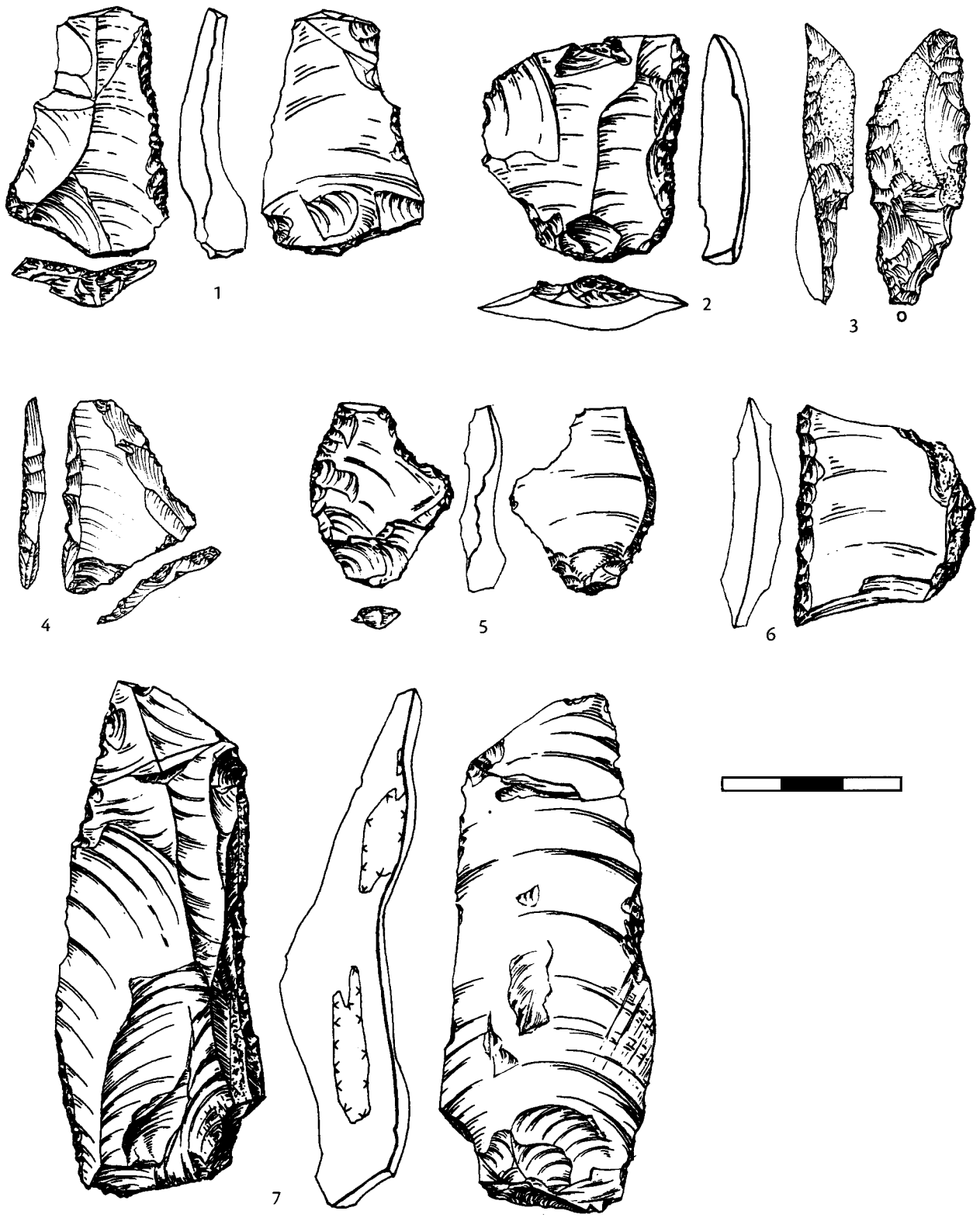

Figure 20-4—Karabi Tamchin Level II/2 tools: 1, 2–lateral straight scrapers; 3–double denticulate tool; 4–retouched flake; 5–simple notched tool; 6–lateral straight scraper with natural back; 7–retouched blade.

retouched tip (Figure 20-3: *3*). Obviously, the distal end of the tool was broken and then it was reutilized. Tip fragments represent broken pointed extremities of points.

Scrapers are mainly convergent or simple lateral (Table 20-10). The single transverse scraper is convex and made on a flake (Figure 20-3: *9*). The transverse-oblique scraper is also on a flake and has a straight retouched edge (Figure 20-3: *8*). All lateral scrapers are straight (Figure 20-4: *1, 2, 6*): one is on a transverse flake (Figure 20-4: *2*), while all others are made on regular flakes. One has a plain back accommodation and is distally truncated-faceted.

Both straight-convex scrapers are relatively large. One is made on a blade (Figure 20-3: *7*), the other on an elongated Levallois blank. The convex-concave scraper is on a regular flake (Figure 20-3: *6*). Both sub-triangular scrapers are made on large chips (Figure 20-3: *5*). All semi-trapezoidal scrapers are canted (*déjeté*). One is made on a broken flake, another on a transverse flake, while the third is on a regular flake (Figure 20-3: *4*). The amorphous scraper is on a regular flake. Both tip fragments are heavily exhausted, broken pointed parts of convergent scrapers. One has alternate retouch of its working edges.

One denticulate on a trimming flake has a straight edge, while the other, on a blade (Figure 20-4: *3*), has two straight edges. Both notched tools are only lightly retouched. The single lateral notch is on a regular flake (Figure 20-4: 5), while the double notch, one lateral and the other distal, is on a broken flake. The perforator is on a crested flake, has alternately retouched edges, and is ventrally thinned at its tip.

Thus, the unifacial tools are comprised of 28 dorsally retouched pieces, 2 alternating retouched pieces, and 1 alternately retouched piece. One piece among these, a scraper, had a natural back; it is also the only laterally truncated-faceted piece. Three of the unifacial pieces have ventral thinning; on two of these the thinning occurs at the tip, while on the third it is basal.

Tool Fragments

Tool fragments are broken tools; all are made on flint with dorsal retouch (Table 20-10).

Retouched Pieces

All retouched pieces are on flint and, aside from three with alternating retouch, all have dorsal retouch (Table 20-10). The laterally retouched pieces include 3 blades, 11 flakes, 1 chip, and 1 chunk. One blade is relatively large (89 mm × 50 mm × 9 mm) and has a multi-faceted platform (Figure 20-4: *7*). The retouched flakes include 7 regular flakes, 1 Levallois flake, and 3 *débordant* flakes. The distal retouched piece is on a broken flake. The bilateral retouched piece is on a transverse flake.

Level III

The tool assemblage of Level III consists of 28 unifacial tools, 19 retouched pieces, and 18 tool fragments. Bifacial tools are absent (Table 20-10).

Unifacial Tools

Over half of the unifacial tools in Level III are scrapers, while points, denticulates, notches, and endscrapers appear in low numbers (Table 20-10). Only two notched tools are made on yellow chert; the others are on flint. All unifacial tools have dorsal retouch, except for a single notched tool with alternate retouch and a convex scraper with inverse retouch.

There are two small point tips and a single lateral point made on an elongated flake (Figure 20-5: *1*).

Scrapers have considerable typological variability, although simple forms are predominant (Table 20-10). The convex transverse scrapers and the transverse-oblique scraper are made on transverse flakes. The former are exhausted (Figure 20-6: *4*). The working edge of the transverse-oblique scraper is straight and has invasive retouch. The straight scraper is made on a flake. The blanks used for simple convex scrapers include 2 regular flakes (Figure 20-6: *2*), 1 blade (Figure 20-6: *1*), 1 elongated Levallois flake (Figure 20-5: *7*), and 1 Levallois blade (Figure 20-5: *8*). The one on a simple blade is ventrally retouched and has ventral back thinning (Figure 20-6: *1*). While the scraper on Levallois flake is lightly retouched, all others have invasive retouch. The lateral scraper with a wavy working edge is made on a broken flake and is lightly retouched (Figure 20-6: *3*). The double-convex scraper is on a chip and has a distal faceted truncation (Figure 20-5: *5*). The double-wavy scraper (Figure 20-5: *3*) is made on a blade and is exhausted. One sub-triangular scraper is on a large chip (Figure 20-5: 2), another is on a flake, and both are invasively retouched. The leaf-shaped scraper is made on a flake (Figure 20-5: *6*) and is exhausted. The semi-crescent scraper is on a chip and has invasive retouch. One of tip fragments is a broken distal part of a convergent scraper and is too small to define the blank type. Another is on a relatively large trimming flake produced during the rejuvenation of the terminal end of a convergent scraper (Figure 20-5: *4*). Both tip fragments are heavy exhausted.

The simple denticulate is lightly retouched and on a flake, although its proximal end has a faceted truncation. The double-wavy denticulate (Figure 20-6: *5*) is made on a blade and is exhausted. All notched pieces have light retouch. Both lateral notches are made on transverse flakes, with alternate retouch. One distal notch is on a transverse flake; the other is broken. The endscraper is atypical (Figure 20-6: *6*), is on an irregularly shaped transverse flake, and has heavy steep combined basal retouch.

There are no tools with back accommodation. Only one tool has ventral thinning, while two tools are proximally truncated-faceted.

Tool Fragments

All tool fragments are flint and have dorsal retouch.

Retouched Pieces

Most retouched pieces (Figure 20-6: *7–10*) are flint, although two are on regular yellow chert flakes. Lateral retouched pieces include 1 blade, 11 flakes, 2 chips, and 1 chunk. There are 8 regular flakes, 1 transverse flake, 1 Levallois flake, and 1 *débordant* flake with marginal dorsal retouch. The distal retouched piece is on a flake. Two of the bilaterally retouched pieces are made on blades and one is on an overpassed flake.

Level IV/2

The tool assemblage of Level IV/2 consists of 4 bifacial tools, 31 unifacial tools, 27 retouched pieces, and 20 tool fragments (Table 20-10).

Bifacial Tools

Each bifacial tool has a different shape (Table 20-10) but all are plano-convex and exhausted. The sub-leaf

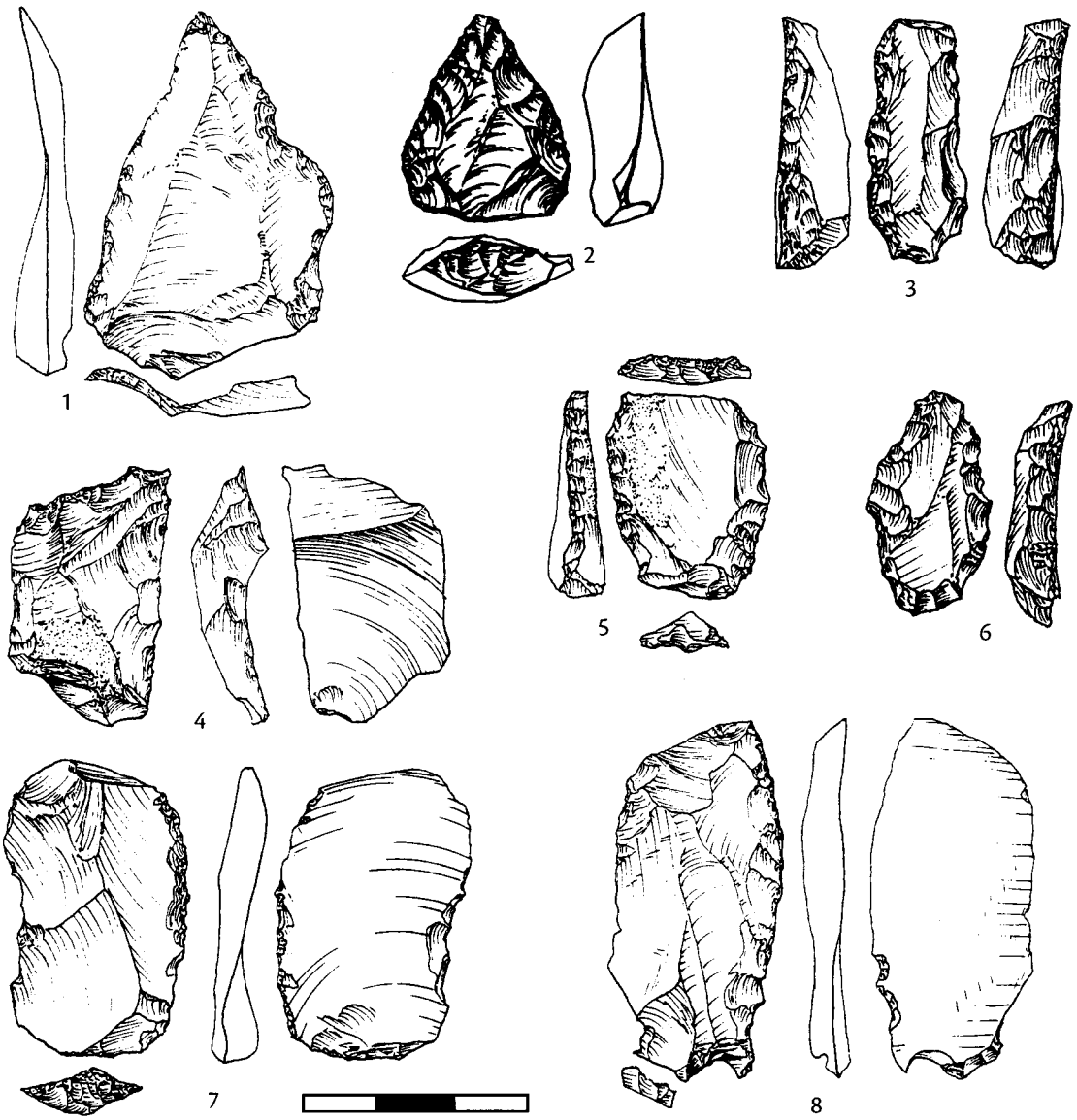

Figure 20-5—Karabi Tamchin Level III tools: 1–lateral point; 2–sub-triangular convergent scraper; 3–double wavy scraper; 4–tip fragment of convergent scraper; 5–double convex scraper; 6–leaf-shaped convergent scraper; 7–lateral convex scrapers made on Levallois flake; 8–lateral convex scraper made on Levallois blade.

example (Figure 20-7: *1*) is on a flint plaquette and is relatively large: 64 mm long, 44 mm wide, and 20 mm thick. Two edges are retouched from the convex side by stepped and scalar retouch. One edge had a natural back, covered by cortex. The edges exhibit traces of resharpening. The sub-triangular example (Figure 20-7: *2*) is also on a flint plaquette (57 mm long, 46 mm wide, and 17 mm thick). Its edges have scalar retouch. It also has a natural back. The sub-crescent bifacial tool (Figure 20-7: *3*) is small: 27 mm in length, 16 mm in width, and 9 mm in thickness. Obviously, the tool is made on a flake. Its edges have scalar and stepped retouch and it is heavily reduced and exhausted through multiple rejuvenations of the working edges. The unidentifiable bifacial tool (39 mm long, 28 mm wide, and 14 mm thick) is broken. It has stepped retouch and is very exhausted.

Unifacial Tools

Unifacial tools in Level IV/2 are mainly scrapers of different types (Table 20-10). Most are on flint, but there are several tools on local chert. Among these are 1 point made on brown chert and 2 simple scrapers made on grey chert. With the exception of 4 scrapers (2 with ventral, 1 with alternate, and 1 with alternating retouch), all tools have dorsal retouch.

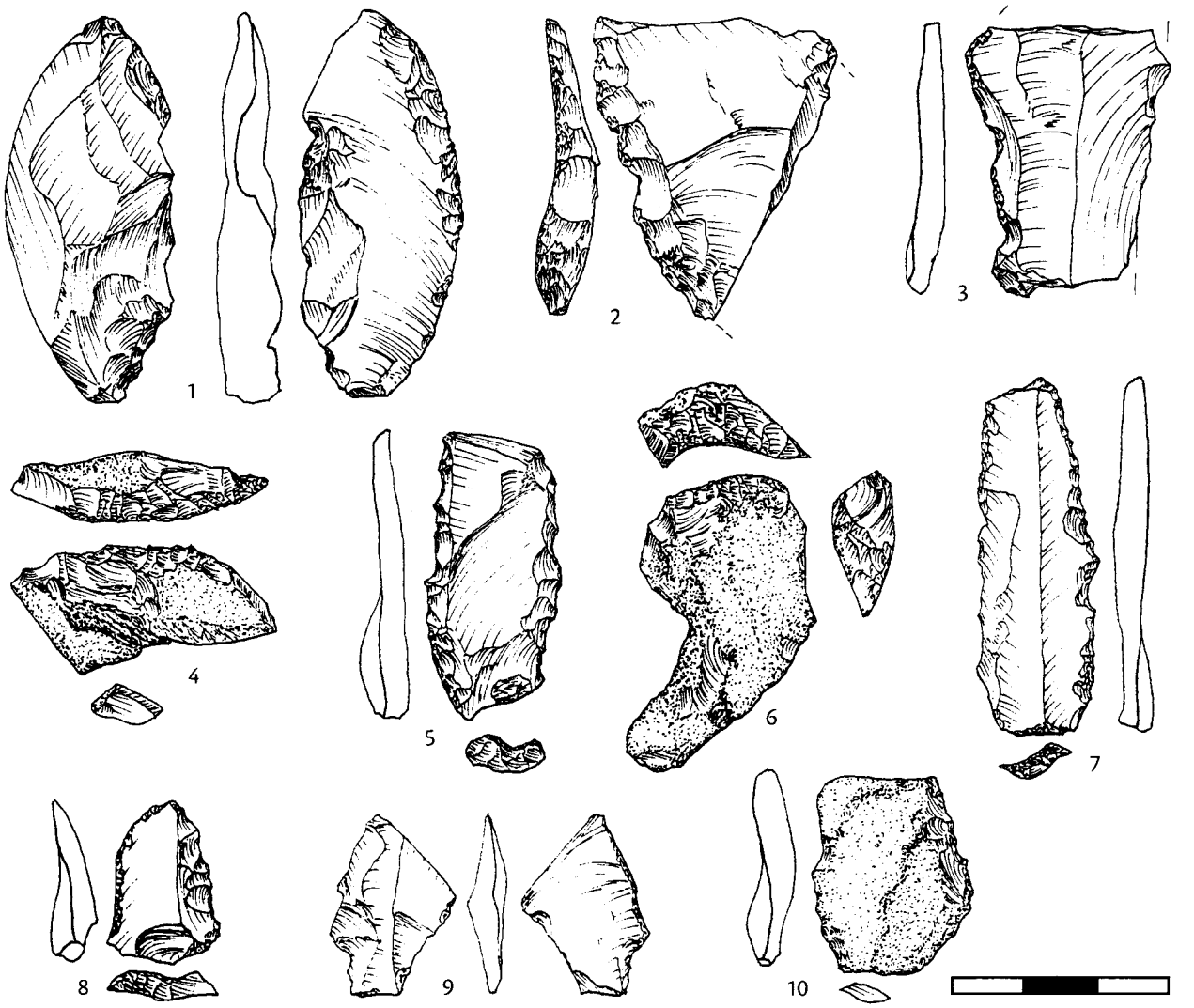

Figure 20-6—Karabi Tamchin Level III tools: *1*–lateral ventrally retouched convex scraper with thinned back; *2*–lateral convex scraper; *3*–lateral wavy scraper; *4*–transversal convex scraper; *5*–double denticulate tool; *6*–atypical endscraper; *7*–retouched blade; *8*, *9*, *10*–retouched chips.

Three of the 4 point tips have invasive retouch and one is heavily exhausted. Three are simple broken fragments but one came from a special rejuvenation of the pointed end of some point. One of broken tips is on chert, all others are on flint. Double and convergent scrapers are most common (Table 20-10). The transverse-oblique scrapers are convex and are on transverse flakes (Figure 20-8: *10*). One is exhausted, while the other is lightly retouched (Figure 20-8: *4*).

Lateral scrapers are mainly convex (Table 20-10). Two with straight edges are on regular flakes and have invasive retouch; one of these also has ventral thinning (Figure 20-8: *9*), another is on blade (Figure 20-8: *6*), and another on a chip. The tool on chip has an alternating lightly retouched edge and a plain back on the opposite edge. Most of the convex scrapers have invasive retouch; only 2 pieces have light retouch. One of these is chip-sized (Figure 20-8: *2*), all others are on flakes (Figure 20-8: *5*, *7*). One flake scraper has ventral basal thinning. Another flake scraper is of grey chert and has a natural back on the unretouched lateral edge. The concave scraper, on a grey flint flake, has invasive, ventral retouch and both surfaces are covered by a deep green patina, although there is no patination on the retouched areas. Obviously, this tool was reutilized from some ancient blank.

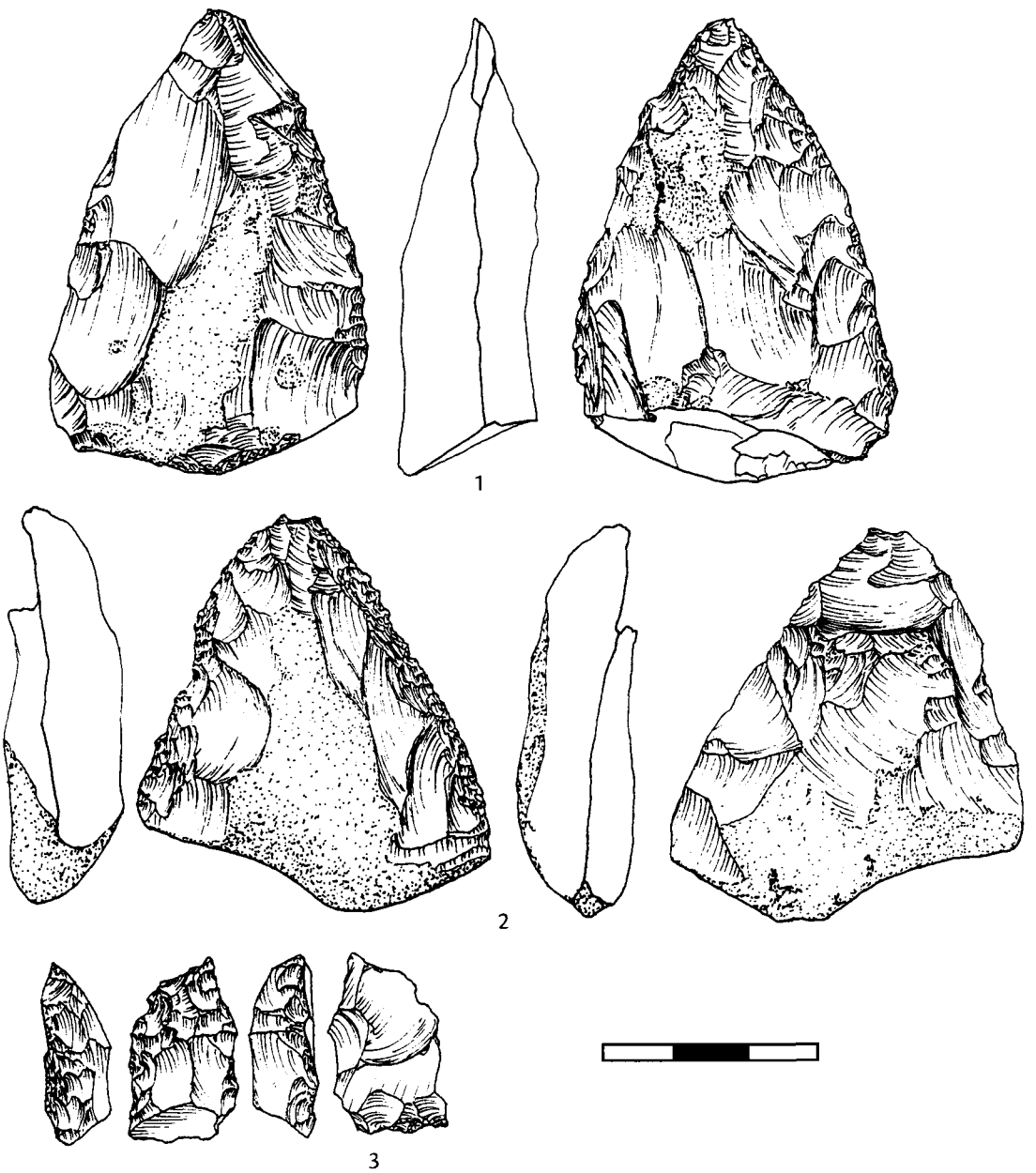

Figure 20-7—Karabi Tamchin Level IV/2 tools: 1–sub-leaf shaped naturally backed bifacial tool; 2–sub-triangular naturally backed bifacial tool; 3–semi-crescent bifacial tool.

Both double scrapers are exhausted. The double-straight scraper is on a chip, while the straight-concave scraper is on a trimming chip.

Convergent scrapers are mainly amorphous (Table 20-10). The semi-rectangular scraper is made on a chip that has light alternate retouch. The semi-trapezoidal scraper is made on a flake by invasive retouch and its proximal end is ventrally thinned. Both semi-rectangular and the semi-trapezoidal scrapers are canted (*déjeté*). Two of amorphous-shaped scrapers are on chips, one is on a blade, and the others are on flakes (Figure 20-8: *1*). All have invasive retouch. Three have the pointed tip at the proximal end of the blank. One of the latter and one regular example have thinned tips. All tip fragments of convergent scrapers are heavy exhausted. Two are broken distal parts of convergent

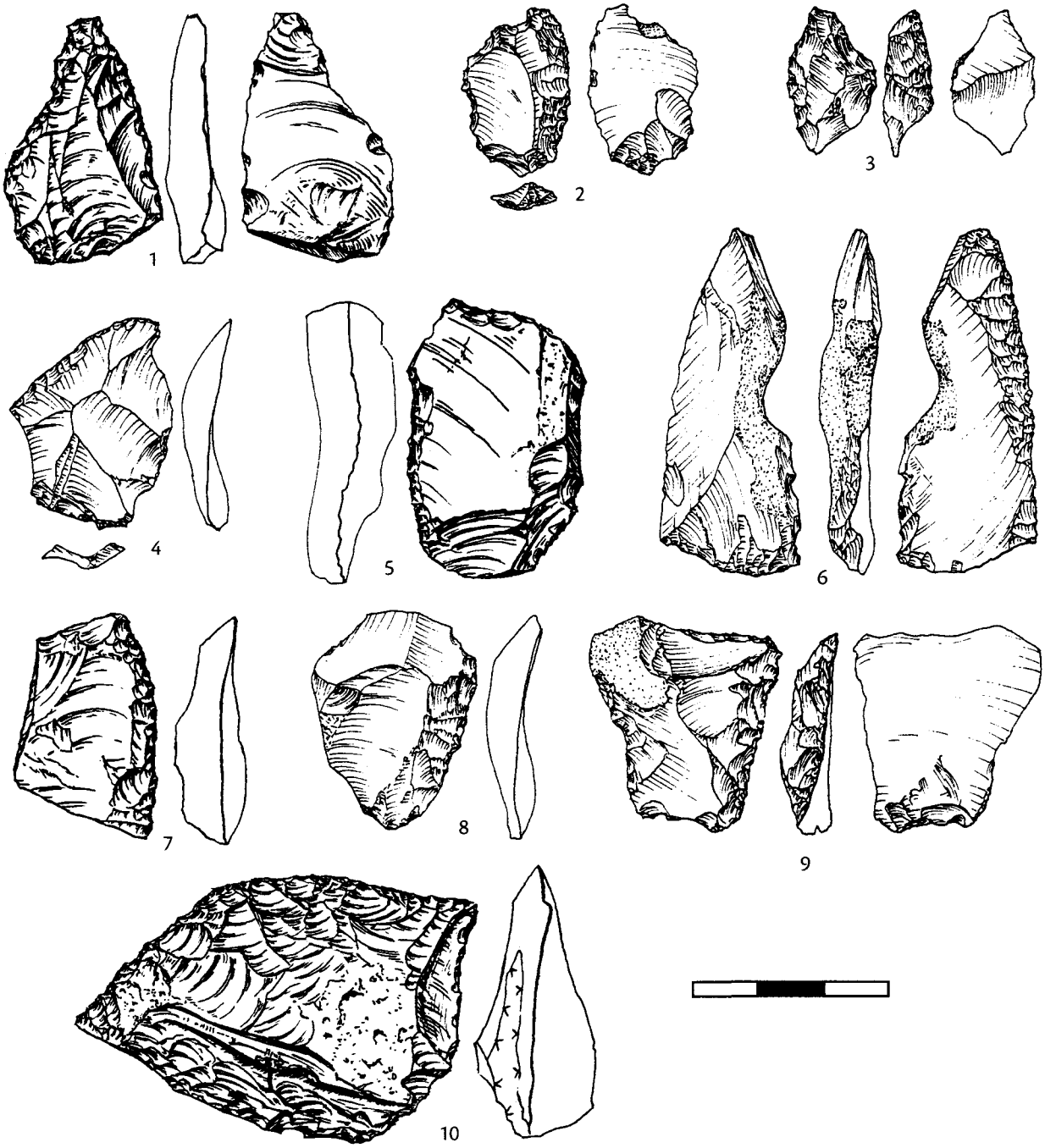

Figure 20-8—Karabi Tamchin Level IV/2 tools: *1*–amorphous shaped convergent scraper; *2*–lateral convex scraper on chip; *3*–tip fragment of convergent scraper; *4, 10*–transversal-oblique convex scrapers; *5*–lateral convex scraper; *6*–lateral convex scraper on blade; *7*–lateral convex scraper on flake; *8, 9*–lateral straight scrapers.

scrapers; the third resulted from the rejuvenation of a convergent scraper (Figure 20-8: *3*).

The notched tool is an exhausted lateral notch on a broken flake with a truncated-faceted distal end.

In sum, 87.1% of the unifacial tools have dorsal retouch, 6.4% are naturally backed, and 3.2% are truncated-faceted. In addition, 16.1% have ventral thinning, all but one basal.

Tool Fragments

Of the tool fragments fragments, one has alternate and one has bifacial retouch. All the others have dorsal retouch (Table 20-10).

Retouched Pieces

Thirteen retouched pieces are on regular flakes, 2 on transverse flakes, and 2 on chips. The regular flakes include 2 with alternating retouch, 1 with ventral retouch, and the rest with dorsal retouch (Table 20-10). One each of the dorsally retouched flakes is on yellow chert and grey chert. Both transverse flakes are flint and have dorsal retouch. One chip is flint with dorsal retouch, the other is yellow chert and is ventrally retouched. The bilaterally retouched pieces include 3 flakes, 1 overpassed blade, and 3 chips. All bilaterally retouched pieces are flint. Most retouch is dorsal, with the exception of one ventrally and two alternately retouched flakes, as well as one alternately retouched blade. Both distally retouched pieces are made on flint flakes. One has dorsal retouch, the other ventral. The proximally retouched piece is on a yellow chert flake and has alternating retouch.

Level V

The tool assemblage from Level V includes 5 bifacial tools, 55 unifacial tools, 59 tool fragments, and 24 retouched pieces (Table 20-10).

Bifacial Tools

All bifacial tools are on flint and all are plano-convex. Each example has a different shape (Table 20-10). The simple convex bifacial tool is on a medium-sized plaquette (71 mm long, 46 mm wide, and 15 mm thick) and has a single convex working edge made by stepped retouch (Figure 20-9: *3*). The side of tool opposite the retouched edge is faceted by retouch. The sub-triangular-shaped bifacial tool (Figure 20-9: *1*) is on a small plaquette (40 mm long, 32 mm wide, and 15 mm thick). Two edges have stepped retouch. The basal end of the tool is broken. The leaf-shaped bifacial tool (Figure 20-9: *2*) is relatively small (29 mm long, 25 mm wide, and 10 mm thick). It is heavy exhausted and semi-bifacial; it could be defined as a reutilized unifacial convergent scraper.

The unidentifiable pieces comprise 2 pointed ends of bifacial tools. Both are exhausted and have almost equal dimensions. One is made on a plaquette (36 mm long, 31 mm wide, and 11 mm thick), while the other is on a flake (32 mm long, 30 mm wide, and 10 mm thick).

Unifacial Tools

The toolkit of unifacial tools, all dorsally retouched, consists mainly of scrapers and points of different types, with scrapers dominating (Table 20-10). Aside from 2 points on grey chert and 3 scrapers on yellow chert, all unifacial tools are made on flint.

Two of the sub-triangular points have their pointed tips proximally positioned (Figure 20-10: *4*), while the other is canted (*déjeté*). The canted point has invasive retouch, as well as a ventrally thinned pointed tip (Figure 20-10: *2*). These sub-triangular points are heavy exhausted. The crescent point is made on a transverse flake and is exhausted. The point tip is canted. The sub-crescent point (Figure 20-10: *5*) is on a grey chert blade, is exhausted, and its point is proximally positioned. The semi-trapezoidal points have invasive retouch, are on broken flakes, and are canted. The amorphous point (Figure 20-10: *9*) is on a grey chert trimming blade and is exhausted. Tip fragments include 4 small broken tips and 3 removals from the rejuvenation of points. One of the rejuvenation tips is proximal and has ventral thinning (Figure 20-10: *1*).

Unifacial scrapers are dominated by simple lateral types (Table 20-10). Transverse scrapers include 2 straight, 1 convex, and 1 wavy. One straight scraper on a broken flake has a plain back at the proximal end. Another straight exhausted scraper is on a chip. The convex scraper is on a transverse flake and is also heavily exhausted. The wavy scraper is made on a chip. The convex and the wavy transverse scrapers have proximal backing. Transverse-oblique scrapers include both straight (Figure 20-11: *7*) and convex types. The straight scraper is on a yellow chert flake, while the convex scraper is exhausted.

Straight lateral scrapers are made on 4 flakes, 3 chips, and 1 blade. One is on yellow chert. Two on flakes have cortex-covered backs (Figure 20-11: *3, 4*). Also, one is proximally thinned and distally truncated-faceted. Most of the lateral straight scrapers are invasively retouched (Figure 20-11: *5*). One chip-dimensioned straight scraper (Figure 20-11: *8*) is on brown chert and is exhausted, while two others are lightly retouched.

The convex lateral scrapers include 2 on flakes (Figure 20-11: *9, 10*), 1 on blade (Figure 20-11: *1*), 1 on chip, and 1 on a trimming flake (Figure 20-11: *6*). The latter is on yellow chert. The scraper on blade is exhausted and its distal end is truncated-faceted. The ones on the chip and the trimming element are lightly retouched, while those on flakes have invasive retouch. The concave scraper is on a transverse flake. It is exhausted and has a faceted back opposite the retouched edge. Wavy scrapers are made on 4 regular

flakes, 1 chip, 1 overpassed flake, and 1 blade. Four have invasive retouch and 3 are heavy exhausted. One, on a regular flake (Figure 20-11: *11*), has a lateral truncated-faceted edge opposite the working edge. The example on a blade (Figure 20-11: *5*) is exhausted.

The double scrapers have various shapes: double-straight, double-convex (Figure 20-10: *8*), and straight-convex (Figure 20-10: *3*). The double-straight scraper is on a chip and has invasive retouch. Both double-convex scrapers are exhausted. One of these is made on a blade. The double-straight one is on flake and is distally truncated-faceted.

There are five different types of convergent scrapers (Table 20-10), most of which are exhausted. Both sub-crescent and semi-crescent (Figure 20-10: *7*) scrapers have proximal points and are made on regular flakes. The tip of the sub-crescent tool is ventrally thinned. Both the sub-rectangular and sub-triangular (Figure 20-10: *6*) scrapers are canted (*déjeté*). The sub-rectangular scraper is made on a chip, while the sub-trapezoidal scraper is made on regular flake. The tip fragment of a convergent scraper is too small to define its blank type.

The transverse denticulate is on a transverse flake and has an exhausted convex working edge. The double denticulate (Figure 20-11: *12*) has invasive retouch. It is on a broken flake and has a straight-concave shape. The endscraper is on a regular flake and could be defined as atypical. Its distal end has steep and stepped retouch, while its lateral edge has flat scalar retouch.

In sum, all unifacial tools are dorsally retouched. Five have backing: 1 is naturally backed and 4 have faceted backing. In addition, there are 4 tools with ventral thinning: 3 at the tip and 1 at the base. There are also 3 distally truncated-faceted and 1 laterally truncated-faceted pieces. The distal end of the basally thinned tool (lateral scraper) is also truncated-faceted.

Tool Fragments

There are 53 dorsally retouched, 2 ventrally retouched, 3 alternately retouched, and 1 bifacially retouched tool fragments. One alternately and two dorsally retouched pieces are yellow chert; all others are flint (Table 20-10).

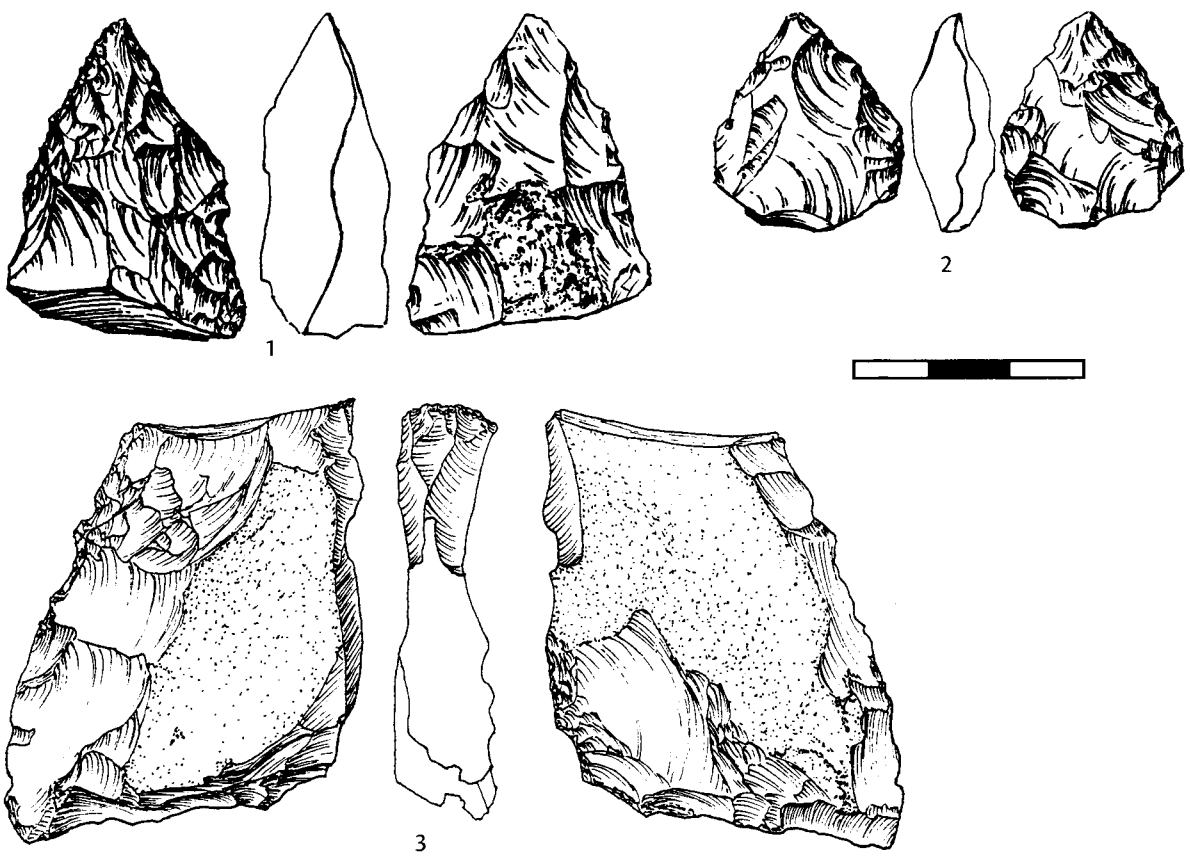

Figure 20-9—Karabi Tamchin Level V tools: 1–sub-triangular bifacial tool; 2–sub-leaf-shaped tool with semi-bifacial elaboration; 3–simple straight bifacial tool, with faceted back accommodation.

Retouched Pieces

The retouched pieces mainly have lateral retouch. Of the latter, 2 are on blades, 6 on regular flakes, 1 on a transverse flake, 1 on a crested flake, and 4 on chips. Both retouched blades are flint, one with dorsal and the other with ventral retouch. Only one regular flake has inverse retouch, all others are dorsally retouched. Two dorsally retouched flakes are yellow chert, while all others are flint. The transverse flake and the crested flake are flint and both are dorsally retouched. All laterally retouched chips are flint. Two of these have dorsal retouch, two others have alternating retouch (Table 20-10).

Bilaterally retouched pieces include 1 on blade, 2 on broken flakes, and 2 on chips. All are made on flint. Both edges of the bilaterally retouched blade have dorsal retouch. Among the retouched flakes, one has dorsal and another has alternate retouch. One of the chips has dorsal retouch and the other has alternating retouch. Distally retouched pieces, 1 flake and 2 chips, are all flint. Both distally retouched chips have dorsal retouch, while the flake has ventral retouch. The two pieces with proximally retouched ends exhibit dorsal retouch and are on flint. One of these is made on a transversal flake, another is made on a chip.

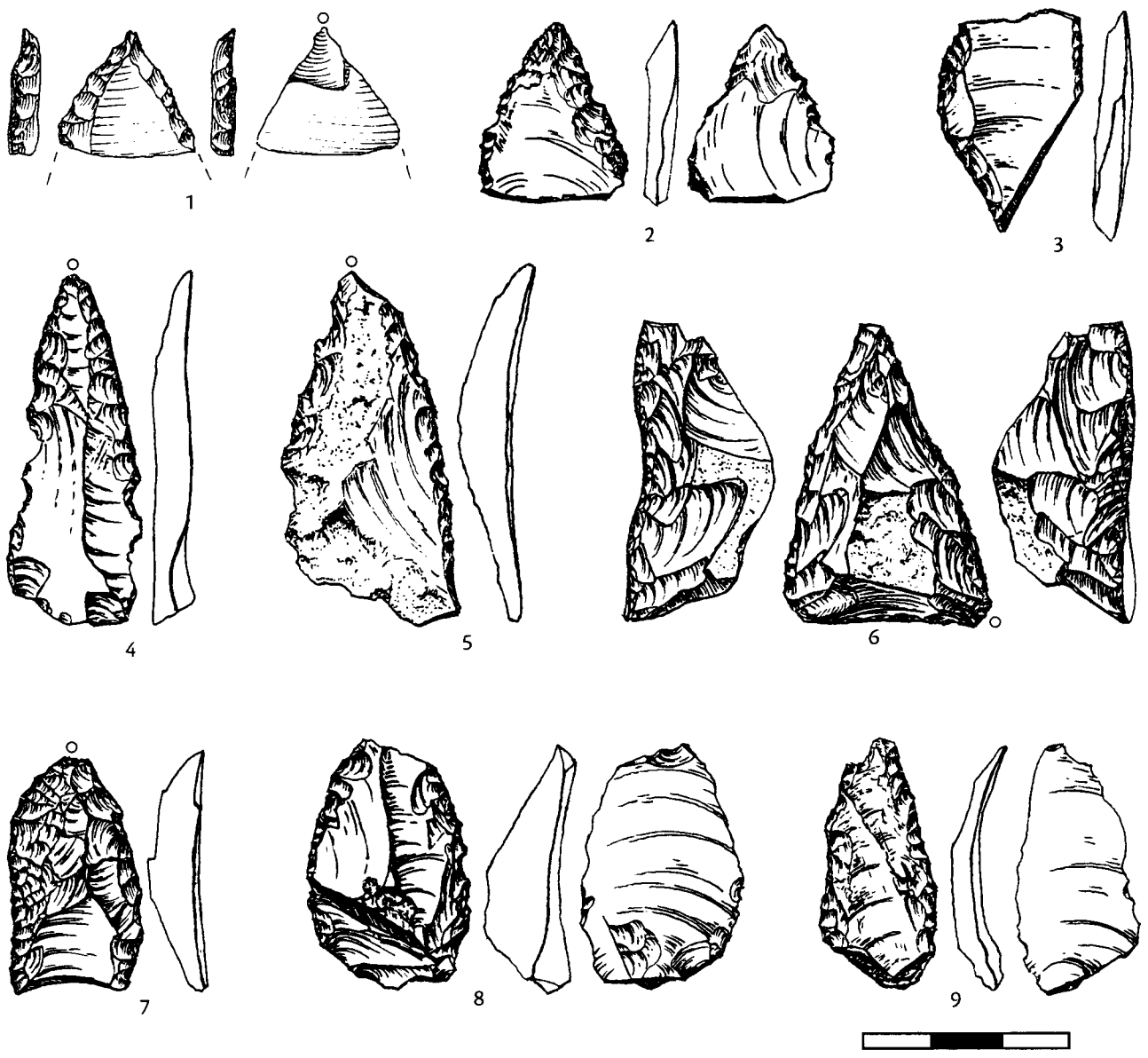

Figure 20-10—Karabi Tamchin Level V tools: 1–tip fragment of reversal (tool orientation is 180° from the technological orientation of its blank) point, tip thinned; 2–sub-triangular canted point, tip thinned; 3–double straight-convex scraper; 4–sub-triangular reversal point on blade; 5–sub-crescent reversal point; 6–sub-triangular canted scraper; 7–sub-crescent reversal scraper; 8–double-convex scraper; 9–amorphous shaped point.

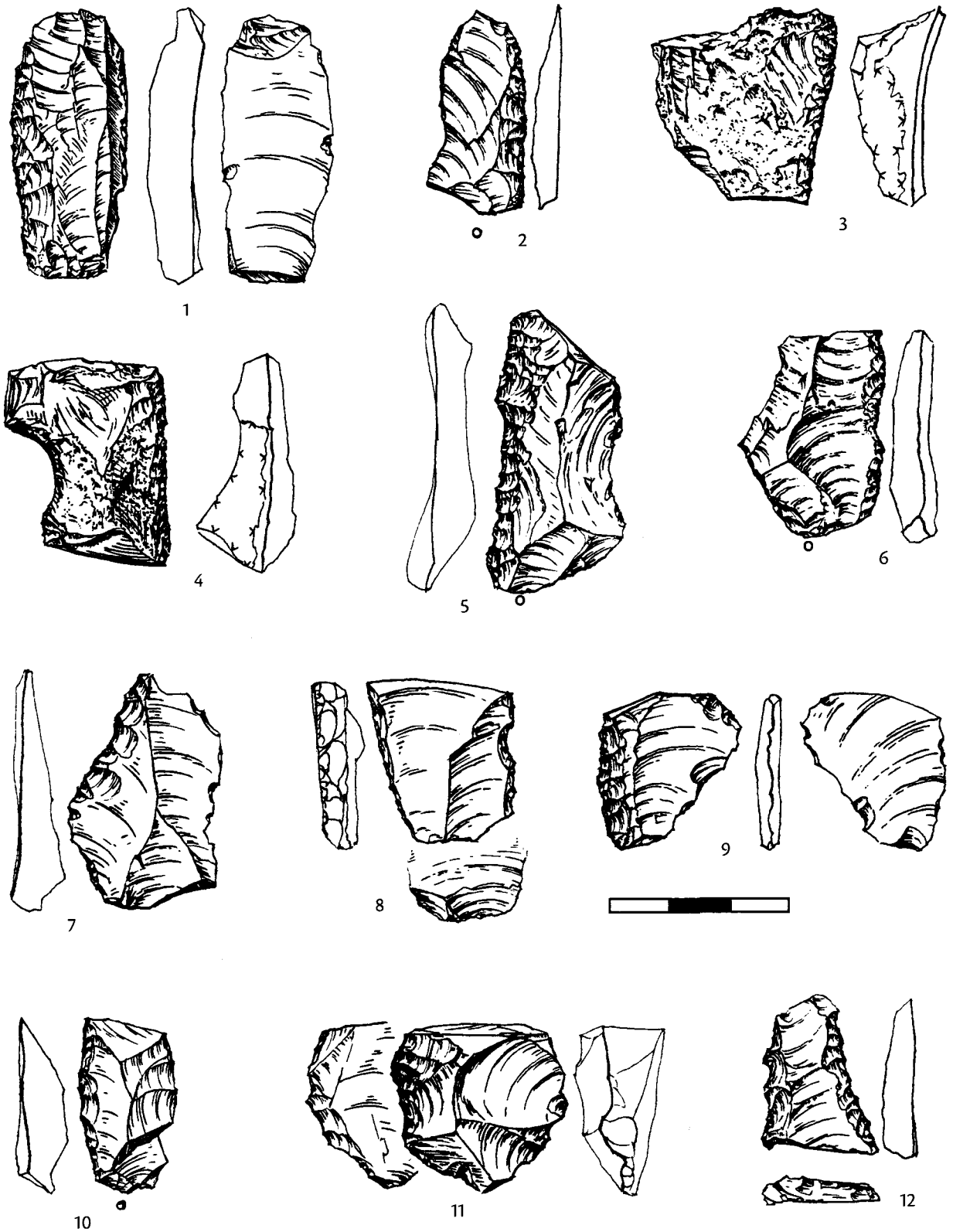

Figure 20-11—Karabi Tamchin Level V tools: *1*–lateral convex scraper, distally truncated-faceted; *2*–lateral straight scraper; *3*, *4*–lateral straight scrapers with natural back accommodation; *5*–lateral straight scraper; *6*–lateral wavy scraper; *7*–transversal-oblique straight scraper; *8*–lateral straight scraper; *9*, *10*–lateral convex scrapers; *11*–lateral convex scraper, laterally truncated-faceted; *12*–double denticulate tool.

Morphological Structure and Degree of Unifacial Tool Retouch

Level II/2

There are 7 points and 19 scrapers in Level II/2 with a combined 44 retouched edges (Table 20-11). Of these edges, 8 have light retouch, 6 have medium retouch, and 30 have heavily retouched edges. There are 1.7 retouched edges per tool (Table 20-12). The lightly retouched edges all have scalar retouch: 4 flat, 3 semi-steep, and 1 steep. Those with medium retouched edges have 2 with semi-steep scalar retouch, 2 with steep scalar retouch, and 2 with flat combined retouch. Among those with heavy retouched edges, 15 have stepped retouch (7 semi-steep and 8 steep), 8 have scalar retouch (3 flat, 4 semi-steep, and 1 steep), and 7 have combined retouch (2 flat, 4 semi-steep, and 1 steep). For all types of retouch, most are either semi-exhausted or are exhausted (Table 20-11).

Level III

Among the unifacial tools in Level III, there are 3 points and 18 scrapers (Table 20-10) that together (Table 20-11) have 32 retouched edges. Of these, 8 have light retouch, 10 medium retouch, and 14 heavy retouch. There is an average of 1.5 retouched edges per tool (Table 20-12). Among the lightly retouched edges, 7 have scalar retouch (6 flat and 1 steep) and 1 has flat combined retouch. Among those with medium retouched edges, 2 have flat scalar retouch, 4 semi-steep scalar retouch, 1 flat combined retouch, and 2 semi-steep combined retouch. Those with heavily retouched edges include 8 with stepped retouch (1 semi-steep and 7 steep), 1 with steep scalar retouch, and 5 with combined retouch (1 flat, 2 semi-steep and 2 steep). Combined, there are 4 not exhausted, 11 semi-exhausted, and 6 exhausted tools. As in the previous level, semi-exhausted and exhausted tools predominate (Table 20-11).

Level IV/2

There are 4 points and 26 scrapers in Level IV/2 with a total of 46 retouched edges, 20 of which have light retouch, 15 medium retouch, and 11 heavy retouch. There is an average of 1.5 retouched edges per tool. Among those with light retouch, 10 are scalar (7 flat, 2 semi-steep, and 1 steep) and 1 has flat combined retouch. Those with medium retouch include 3 with stepped retouch (1 flat, 2 semi-steep) and 12 with scalar retouch (4 flat, 7 semi-steep, and 1 steep). Among the heavily retouched edges, 13 are stepped (4 semi-steep and 9 steep), 6 are scalar (3 flat and 3 semi-steep), and 1 has combined flat retouch. As usual, semi-exhausted and exhausted tools significantly outnumber those that are not exhausted (Table 20-11).

Level V

Combined, the 15 unifacial points and 37 unifacial scrapers account for 80 retouched edges in Level V. Of these, 5 have light retouch, 25 medium retouch, and 50 heavy retouch. Again, there is an average of 1.5 retouched edges per tool. The light retouch is all scalar, 3 flat and 2 semi-steep. The medium retouch includes 2 with steep stepped retouch, 22 with scalar retouch (8 flat, 13 semi-steep, 1 steep), and 1 with semi-steep combined retouch. Among the heavily retouched edges, 29 have stepped retouch (18 semi-steep and 11 steep), 18 scalar retouch (7 flat, 10 semi-steep, and 1 steep), and 3 combined retouch (1 flat and 2 semi-steep). Again, the semi-exhausted and exhausted edges dominate (Table 20-11).

Table 20-12
Occupation characteristics of assemblages from Karabi Tamchin

	Level II/2	*Level III*	*Level IV/2*	*Level V*
Percentage of tools	54.4	54.6	67.2	66.5
Retouched edges : tools	1.7 : 1	1.5 : 1	1.5 : 1	1.5 : 1
Blanks[1] : cores	23.0 : 1	19.2 : 1	31.6 : 1	no cores
Blanks[1] : cores + bifacial tools	23.0 : 1	19.2 : 1	13.6 : 1	30.2 : 1
Tools on blanks[2] : cores + bifacial tools	12.3 : 1	9.4 : 1	8.3 : 1	15.8 : 1
Tools on blanks[2] : unretouched blanks	1.1 : 1	0.9 : 1	1.6 : 1	1.1 : 1
Density of artifacts[3] per cubic meter	41.2	47.6	48.8	98.0

[1]without tool fragments
[2]identifiable tools only
[3]all artifacts, excluding chips and chunks

Tool Treatment Elements

A large proportion of the tools in the four assemblages of Karabi Tamchin are heavily retouched, with multiply rejuvenated and modified working edges. Among flakes, blades, and chips, there are some trimming elements that were by-products of secondary tool treatment, as well as by-products tool edge modification. These include resharpening elements of tool edges and rejuvenation elements of pointed tips and bases.

These resharpening elements have faceted or plain platforms, with lipping, obtuse platform angles, numerous proximally positioned dorsal scars, incurvate or twisted lateral profiles, and expanding or irregular shapes. In most Middle Paleolithic studies, these are usually attributed only to bifacial thinning (Bordes 1961; Newcomer 1971; Schild and Wendorf 1977; Bradley and Sampson 1986; Demidenko and Usik 1993c; Chabai and Demidenko 1998). This attribution appears questionable, because such resharpening elements might come both from the thinning of bifacial tools and from renewing the edges of unifacial tools. Moreover, extensive resharpening of tool edges also took place in industries where bifacial thinning, as well as bifacial tools, are uncommon (Dibble 1988, 1991; Kuhn 1995). In practice, it is often too difficult to separate trimming elements from bifacial and unifacial tools if both kinds of tools are present in the toolkit. In fact, only the characteristics of platform preparation, when visible, may provide a relatively clear basis for separating them. It is important to note as well that some flakes and chips derived from obtuse supplementary core platforms might have characteristics close to resharpening elements.

Level II/2

There are 2 resharpening elements and 1 rejuvenation element in Level II/2. The resharpening elements are a flake and a chip. The resharpening flake is relatively large (39 mm × 32 mm × 6 mm) with a faceted platform 12 mm wide and, given its platform, might have been derived from the thinning of a bifacial tool. This flake was used as a blank for the preparation of a denticulate. However, neither bifacial tools nor a bifacial thinning strategy are known in this assemblage. Thus it is possible that this blank was scavenged from some open occupation of another industry, where bifacial tools were common. Moreover, it is on a grey flint with greenish patina, otherwise unknown in this level. The chip is medium-sized (11 mm × 11 mm × 4 mm) and has a plain platform, which might suggest its origin was in unifacial tool resharpening. The rejuvenation element is a medium-sized chip (8 mm × 16 mm × 3 mm) and was struck from the basal part of a unifacial tool.

Level III

There are 20 resharpening elements and 1 rejuvenating element in Level III. The resharpening pieces are comprised of 1 unretouched flake and 19 chips. The flake is not large (38 mm × 32 mm × 7 mm) and has a concave faceted platform that suggests it came from bifacial thinning, although neither bifacial tools nor a bifacial thinning strategy has been noted in this level. Obviously, it again may be the result of artifact scavenging. Another possibility is that this piece came from the production of a supplementary core platform, since it has no clear proximal retouch scars. The resharpening chips include 1 large chip, 9 medium chips, and 9 small chips. The largest chip (26 mm × 20 mm × 2 mm) has a plain platform 6 mm wide. Almost all medium- and small-sized chips have plain platforms; only one medium chip is faceted. Possibly, this chip came from a supplementary core platform.

The rejuvenation element is relatively large (35 mm × 20 mm × 12 mm), has a sharp pointed tip, and part of a laterally retouched tool edge. Typologically, it is a point tip fragment.

Level IV/2

There are 37 resharpening and 4 rejuvenating elements in Level IV/2. Among resharpening elements are 35 chips, 1 flake, and 1 blade. The flake is relatively small (28 mm × 32 mm × 5 mm), has a faceted platform, and was a blank for a double scraper. The blade also is small (36 mm × 14 mm × 4 mm) and has a faceted platform.

There are 3 large, 16 medium, and 16 small chips. Two large chips have faceted platforms and one has a plain platform. One of the former was used as a blank for a lateral scraper. Only one medium chip has a faceted platform; all others have plain platforms. One such chip is grey chert, while all others are flint. The striking platforms of small chips include 3 faceted and 13 plain platforms. Since bifacial tools are present in this level, resharpening elements that have faceted platforms might be by-products of bifacial tool thinning.

The rejuvenation elements include 2 pointed tips and 2 basal tool fragments. One point tip fragment (8 mm × 18 mm × 3 mm) has a relatively wide plain platform (15 mm × 4 mm). The other tip is also small (13 mm × 23 mm × 6 mm), has a narrow platform (0.8 mm × 0.7 mm), and is from a convergent scraper. Both basal fragments are small, and derive from unifacial tools, as do both pointed tips.

Level V

There are 51 resharpening and 6 rejuvenating elements in Level V. The resharpening elements include 4 flakes, 3 blades, and 44 chips. The largest, on yellow chert, is relatively small (35 mm × 25 mm × 5 mm), has a faceted platform, and was used as blank for a lateral scraper. Other flakes are unretouched, are smaller, and have plain platforms.

Two resharpening blades are whole and one is broken. The largest (37 mm × 18 mm × 4 mm) is grey chert, has a faceted platform, and was used as a blank for a unifacial point. The other complete blade (34 mm × 12 mm × 4 mm) and the broken one have plain platforms and show no traces of secondary retouch.

The resharpening chips comprise 8 large, 24 medium, and 12 small pieces. Among the large chips, 2 are grey chert, while all others are flint. One of these has a faceted platform, the other has a plain platform. The flint chips include 3 with faceted platforms and 3 with plain platforms. Among the medium-sized chips, 2 are grey chert and 22 are flint. Both chert chips have plain platforms, while 2 of the flint chips have faceted platforms. All of the small chips are flint and only one has a faceted platform; all others have plain platforms. Given the presence of bifacial tools in this level, resharpening elements that have faceted platforms might be expected as by-products of bifacial tool thinning.

The rejuvenating elements are flint and include 3 pointed tips and 3 basal parts. The pointed tips are small, the maximum dimensions being less than 20 mm. All are classified as unifacial point tip fragments, based upon tip sharpness. One basal fragment might be from a bifacial tool, while the two others probably came from unifacial tools.

Inter-Assemblage Comparisons

The lithic assemblages clearly can be divided technologically and typologically into two groups. The assemblages of Levels II/2 and III are based on a Levallois technology of core reduction, and lack bifacially flaked tools and their by-products. In contrast, the assemblages of Levels IV/2 and V have bifacial tools and no Levallois technology. Although cores and/or their by-products are present in Levels IV/2 and V, blank production for tool manufacture was based mainly on bifacial thinning by-products, rather than on regular core reduction.

The typological and technological characteristics of the Levels II/2 and III assemblages exhibit close affinities with the Western Crimean Mousterian (WCM), while the assemblages of Levels IV/2 and V are closest to the Crimean Micoquian (CM).

On the other hand, the Karabi Tamchin assemblages do have some peculiar typological and technological characteristics that make them distinct, both from the "classical" Western Crimean Mousterian and the "classical" Crimean Micoquian.

Western Crimean Mousterian Assemblages from Levels II/2 and III

Blanks for tool production in Levels II/2 and III were produced in a Levallois reduction strategy. Although most cores are small and exhausted, they exhibit unidirectional flaking surface scars and supplementary platforms used to control lateral and distal convexities during core reduction. Flakes have a predominance of unidirectional and unidirectional-crossed scar patterns in both levels. Also, there are a several Levallois blanks, as well as crested and *débordant* blanks. Such scar patterns and core shaping elements are expected from a Levallois core reduction strategy. Blanks with such scars were possibly produced from the parallel and unidirectional cores with supplementary lateral platforms. Blanks with bidirectional scars are relatively rare (7.3% and 4.6%), indicating rarer use of bidirectional cores.

These assemblages produced a moderate percentage of blades (Ilam = 25.0 in Level II/2 and Ilam = 21.7 in Level III), which is characteristic for the Western Crimean Mousterian (Chabai 1998b, 2000b). Distal profiles have high rates of blunt and hinged ends, which, combined, account for some 60% of all distal ends in both levels. These types of terminations, along with the low occurrences of lipped platforms, might have resulted from a prevalent use of hard hammer flaking.

Both assemblages exhibit almost the same blank shape frequencies, dominated by expanding and irregular shapes. Incurvate lateral profiles account for about half in each level and, moreover, twisted profiles are common. When these incurvate and twisted profiles are combined, they account for more than 70% of all profiles in both assemblages. The high percentage of trapezoidal/expanding shapes, in association with the high proportion of incurvate/twisted lateral profiles is expected when the technology is based on bifacial reduction, such as in the Micoquian of Starosele Level 1 (Marks and Monigal 1998:137). Obviously, such an explanation cannot be used for Levels II/2 and III at Karabi Tamchin because bifacial reduction is *not* characteristic for these assemblages. On the other hand, the Western Crimean Mousterian at Kabazi II Unit II has comparable lateral profile

characteristics: a combination of incurvate/twisted profiles account for 53.6% of all profiles, although the percentage of flat profiles (40.1%) is much higher than at Karabi Tamchin (Chabai 1998c: tables 9-6, 9-15). In addition, rectangular shapes are predominant among both flakes (42.0%) and blades (51.7%) at Kabazi II (Chabai 1998c: tables 9-4, 9-13), while expending and irregular shapes are characteristic of Levels II/2 and III at Karabi Tamchin. The reason for these differences is probably due to the marked dissimilarity in distances to raw material for Kabazi II and Karabi Tamchin. At Kabazi II Unit II, the exploitation of raw materials was not restricted by distance to raw material and this is illustrated by the large dimensions of cores, debitage, and tools. The core reduction strategies at that site were based on strict control of blank shape by additional distal/lateral removals from supplementary platforms. Although Levels II/2 and III at Karabi Tamchin were based on a similar core reduction strategy, the site was remote from quality raw materials, as seen by the small size of transported raw material pieces and by the reduction of cores to full exhaustion.

Consistent rejuvenation of striking platforms reduced core length, so they became more wide than long. This resulted in an appreciable number of transverse blanks with expanding and irregular shapes. Transverse flakes account for 13 of 47 identifiable flakes in Level II/2 and 15 of 55 flakes in Level III. Thus, the predominance of irregular and expanding shapes in these levels might be directly connected with raw material shortage.

Levels II/2 and III have extremely high faceting indices (Table 20-13), higher than in other Western Crimean Mousterian assemblages. Also, the Levels II/2 and III assemblages are characterized by a relatively high tool to core ratio, in association with a relatively low blank to core ratio (Table 20-12), which might suggest a mixed pattern of on-site and off-site tool production. Additional evidence for tool import comes from artifacts made on local raw materials. In Level III, all artifacts made on yellow chert are tools, while there are neither debitage nor cores made on such material. It is possible that the degree of tool importation into Karabi Tamchin was much greater than at other sites because of its distance to quality raw material sources.

It also should be noted that a majority of unretouched blanks and tools in Levels II/2 and III are relatively small, while larger blanks and tools are common in Western Crimean Mousterian assemblages. Obviously, taking into account the paucity of flint, the predominately small blanks and tools might mean a much more extensive and intensive utilization of raw material and a much greater modification of tools than seen elsewhere.

Because of the small tool samples in these levels, the percentages of tool types have questionable meaning. Nevertheless, scrapers are dominant in each level: 61.3% in Level II/2 and 64.3% in Level III. The simple scrapers (lateral, transverse, and transverse-oblique) dominate, although they have some variability in shape. In Level II/2, 7 out of 8 simple scrapers have straight retouched edges, and only 1 has a convex working edge. In contrast, in Level III, 7 simple scrapers are convex, 2 are straight, and 1 is wavy. It is important to note that 2 of convex lateral scrapers in Level III are made on Levallois blanks.

TABLE 20-13
Karabi Tamchin technological indices

	Level II/2	*Level III*	*Level IV/2*	*Level V*
Ilam	25.0	21.7	18.2	20.5
IF large	75.5	69.2	55.3	39.0
IF strict	69.4	53.8	31.6	16.9
% Levallois blanks	3.6	4.4	0	0

Since double scrapers are rare, working edge shape distributions are meaningless. It is important to note that the one straight-convex scraper in Level II/2 is made on a Levallois blank.

Convergent scrapers have variable shapes but, again, small sample sizes make this variability uninterpretable at the type level. There are, however, two different patterns by level. In Level II/2, 3 of 8 convergent scrapers are canted. In contrast, all convergent scrapers from Level III are on-axis. It is possible that some of the canted scrapers were scavenged from some nearby Crimean Micoquian site.

There are more points in Level II/2 (22.6%) than in Level III (10.7%). As for the convergent scrapers, points in Level III are all distal, while one in Level II/2 is proximal. Denticulates, notched pieces, and other tools occur in very small numbers in each level but without patterning. There is one retouched piece in Level II/2 and in Level III that is on a Levallois blank.

Thus, the two tool assemblages from Level II/2 and Level III are very similar, although there are some differences in proportional occurrences (Tables 20-14 and 20-15), as well as in the shapes of convergent tools. Such differences might be related to distinct tool reduction models. The proportion of simple tools (one retouched edge) to complex tools (two or more retouched edges) is also much lower in Level II/2 than it is in Level III. On the other hand, WCM tool assemblages are characterized by a predominance of lightly retouched tool edges and it is very difficult to find any heavily retouched tool in some WCM assemblages (e.g., Kabazi II Unit II: Chabai 1998c). In the case of Karabi Tamchin Levels II/2 and III, most unifacial tools have invasive, heavily retouched edges. The ratio of the number of retouched edges per tool is 1.7 : 1 for Level II/2 and 1.5 : 1 for Level III. Obviously, the long distance to quality raw materials was the main reason

TABLE 20-14
Karabi Tamchin morphological structure of unifacial points and scrapers

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Simple tools	8	30.8	10	47.6	14	46.7	27	51.9
Double tools	3	11.5	2	9.5	2	6.7	5	9.6
Convergent tools	15	57.7	9	42.9	14	46.7	20	38.5
Total	26	100.0	21	100.0	30	100.0	52	100.0

TABLE 20-15
Karabi Tamchin morphological structure of points, scrapers, and bifacial tools

	Level II/2		*Level III*		*Level IV/2*		*Level V*	
	N	*%*	*N*	*%*	*N*	*%*	*N*	*%*
Simple, unifacial	8	30.8	10	47.6	14	41.1	27	47.3
Complex, unifacial†	18	69.2	11	52.4	16	47.1	25	43.9
Bifacial tools	–	–	–	–	4	11.8	5	8.8
Total	26	100	21	100	34	100	57	100

†The sum of double and convergent scrapers and points.

why tools from the Western Crimean Mousterian levels at Karabi Tamchin are much more heavily retouched than are the tools from other Western Crimean Mousterian occupations.

The tool assemblages of Levels II/2 and III exhibit, however, some differences in the degree of tool exhaustion. Semi-exhausted tools account for almost half of all tools in each level: 46.2% and 52.3%, respectively. The percentage of lightly retouched "fresh" tools in Level II/2 (11.5%) is much lower than in Level III (19.1%), while the opposite is true for exhausted tools.

Most points and scrapers in both levels have invasive retouch and are either semi-exhausted or exhausted. Moreover, tools with two or more worked edges account for more than half of all tools (65.2% in Level II/2 and 52.9% in Level III). If, as supposed, retouch intensity reflects how long tools were used, the high percentage of invasively retouched, exhausted tools, as well as the large proportion of complex tools, might suggest a greater degree of tool curation than found at other WCM sites. Such a strategy would be directly linked to distance from quality raw materials.

According to previous work, the Western Crimean Mousterian is subdivided into two developmental stages, based on differences in the technological strategies of primary flaking. There are no significant typological differences in tool assemblages correlated with these stages, however (Chabai 2000b).

To compare the WCM assemblages of Karabi Tamchin with other Western Crimean Mousterian assemblages, several occupations were selected to represent both stages of WCM development (Table 20-16). Stage 1 is based on the Levallois method (Shaitan-Koba upper level and Kabazi II Levels II/7F8–II/8) and Stage 2 is based on blade technology (Kabazi II Levels II/1A to II/7).

The small core samples and their exhausted state in both Levels II/2 and III make it difficult to define core types used in the WCM assemblages of Karabi Tamchin. Cores with supplementary platforms, however, as well as Levallois blanks, are present in both levels. Given that Levallois cores and blanks appear in Stage 1 occupations (Shaitan-Koba upper level and Kabazi II Level IIA/2) and disappear in Stage 2 (Level II/5 of Kabazi II), it is likely that the Karabi Tamchin assemblages belong within Stage 1. Based on the Levallois indices,

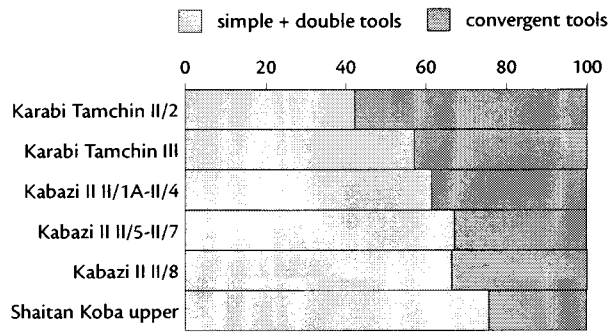

Figure 20-12—Karabi Tamchin Levels II/2 and III in the context of the Western Crimean Mousterian.

TABLE 20-16
Karabi Tamchin Levels II/2 and III in the context of the Western Crimean Mousterian†

	Karabi Tamchin L. II/2	*Karabi Tamchin L. III*	*Kabazi II L. II/1A-II/4*	*Kabazi II L. II/5-II/7*	*Kabazi II L. II/8*	*Shaitan Koba upper*
Simple+double tools	42.3	57.1	61.4	67.0	66.3	75.5
Convergent tools	57.7	42.9	38.5	32.9	33.7	24.4
Ilam	25.0	21.7	36.5	33.0	21.7	16.4
IF large	75.5	69.2	58.9	67.3	65.8	57.5
IF strict	69.4	53.8	32.4	44.5	47.6	41.8
% Levallois blanks	3.6	4.4	0	1.4	4.3	~10.0

†Data from Chabai and Marks 1998.

the Karabi Tamchin assemblages are most like the Stage 1 assemblages of Kabazi II Levels II/5 to II/8.

Typologically, Levels II/2 and III are similar to other Western Crimean Mousterian assemblages, although the toolkit of Level III has fewer points, while in Level II/2 points and convergent scrapers occur in relatively high proportions. On the other hand, tool samples from WCM levels of Karabi Tamchin are so small that proportional variations are probably meaningless.

Morphologically, Level III has a ratio of simple to convergent tools that is close to the WCM assemblages from Kabazi II and Shaitan-Koba (Table 20-16, Figure 20-12). Overall, the proportional occurrence of convergent tools increases throughout the WCM sequence. Taking into account the apparent technological position of Level III, its ratio of simple to convergent tools might suggest a relatively late place in the developmental sequence. As noted above, however, the higher percentage of convergent tools probably reflects the distance from raw material sources. Other differences, such as the high percentage of convergent tools (Table 20-16, Figure 20-12), the dominance of heavy invasive retouch, and the high percentage of semi-exhausted and exhausted tools, all can be explained as functions of raw material scarcity. This scarcity brought about a somewhat different pattern of raw material exploitation than seen at WCM sites situated closer to raw material sources.

Crimean Micoquian Assemblages from Level IV and Level V

The assemblages of Levels IV/2 and V have technological characteristics of primary flaking (Table 20-12) based on multi-platform and unidirectional/convergent cores without supplementary platforms, as seen in Level IV/2. Dorsal scar patterns indicate that some blanks could have been derived from such cores. The use of hard hammer flaking is common, seen by the low percentage of lipped blank platforms and the high proportion of hinged and blunt blank distal extremities. There are no signs of Levallois technology among the blanks, although Level IV/2 has a high percentage of both faceted platforms and blades (Table 20-17).

The blanks from Level V (no cores were found) have a much lower percentage of faceted platforms (Table 20-17). Again, the use of hard hammer flaking was predominant. Although the percentage of elongated blanks is relatively high (Table 20-17), most blades derived from a bifacial reduction strategy. No Levallois blanks were found in Level V.

It should be noted that the Crimean Micoquian assemblage of Starosele Level 1 also had relatively high blade and faceting indices (Table 20-17). This was explained as a function of the shaping and thinning of bifacial tools (Marks and Monigal 1998:130, 135). The same explanation might be used for Levels IV/2 and V at Karabi Tamchin. There is no evidence that the high percentage of blades came from a purposeful blade technology. Blade cores are completely absent in both levels. On the other hand, there is an appreciable number of trimming elements and bifacial tools in these assemblages. The use of by-products of bifacial tool reduction as blanks for unifacial tools is very characteristic for the Crimean Micoquian. Obviously, the paucity of raw materials at Karabi Tamchin logically indicates intensive exploitation of all blanks, including some chips and trimming elements.

Additional explanations for the relatively high faceting index in Level IV/2 could come from the tool assemblage. As noted above, some tools and blanks from Levels II/2 and III were imported into Karabi Tamchin from other occupations. Probably, the same economy of raw materials pertained during the Crimean Micoquian occupations. Again, additional evidence for tool importation comes from artifacts made on local raw materials. In Level IV/2 there is a unique piece of brown chert made into a tool. In Level V, two tools made on grey chert and two tools made on brown chert were found, but there were neither corresponding cores nor debitage of such cherts. Moreover, cores are absent in Level V, while a good number of tools are on blanks derived from core reduction.

All the assemblages have almost the same blank shape patterns. The predominant blank shapes are expanding and irregular; other types occur sporadically. Distal profiles are characterized by high percentages of blunt and hinged extremities that obviously resulted from hard hammer flaking.

About half of all lateral profiles are incurvate in each level, and twisted profiles are also common. When these incurvate and twisted profiles are combined, they account for more 70% of all profiles in each assemblage. The high percentages of trapezoidal/expanding shapes, in association with high percentages of incurvate/twisted lateral profiles, are expected when the technology is based on bifacial reduction, such as that of Starosele Level 1 (Marks and Monigal 1998:137). Obviously, the same explanation might be adopted for the assemblages of Levels IV/2 and V, which are Crimean Micoquian.

The blanks from Levels IV/2 and V have mostly unidirectional and unidirectional-crossed scar patterns, in almost equal proportions. The intensive ad hoc exploitation of multi-platform cores and the use of the by-products of bifacial thinning are characteristic of these assemblages. On the other hand, both the exploitation of multi-platform cores and the thinning of bifacial preforms in Levels IV/2 and V might have resulted in blanks with unidirectional and/or unidirectional-crossed scar patterns. The relatively high percentages of unidirectional and unidirectional-crossed scar patterns are common for many Crimean

Micoquian assemblages (e.g., Marks and Monigal 1998:139; Yevtushenko 1998b:290).

There are no Levallois blanks either as tool blanks or as unretouched blanks. There are, however, blanks expected from bifacial tool thinning in the debitage, as well as in the tool samples from Levels IV/2 and V. It is should be noted that several blanks with crested and *débordant* scar patterns occur in Levels IV/2 and Level V, but those blanks are not connected with the core reduction strategies of these levels. Blanks with crested and *débordant* scars came from the rejuvenation of bifacial tool edges. Moreover, one *débordant* blade from Level IV/2 is made on a greenish patinated dark grey flint that is unique for the level.

Most unretouched blanks and tools in Levels IV/2 and V are relatively small: obviously, the result of raw material scarcity.

Bifacial tools are present in small numbers in Levels IV/2 and V, but their proportional occurrences mean little. Nevertheless, the bifacial toolkits are similar. Almost all bifacially flaked tools from Levels IV/2 and V are plano-convex and are made on flint plaquettes. The complex tools, those with two or more retouched edges, dominate both assemblages. Bifacial tool forms are variable (Table 20-10), but some shapes occur in both levels. Backed bifacial tools are present in both assemblages.

The dominant tool class is the scraper in both levels: 74.3% in Level IV/2 and 61.7% in Level V. The simple scrapers (lateral, transverse, and transverse-oblique) from Level IV/2 and Level V have similar shapes (Table 20-10). The same is true for double and convergent scrapers, although the larger sample sizes have more variability (Table 20-10).

There are more points Level V (25.0%) than in Level IV/2 (11.4%). All points in Level IV/2 are tip fragments, however. Those from Level V exhibit considerable morphological variability (Table 20-10). Owing to small tool samples in both levels, the occurrences of other tool classes are sporadic.

Although the ratio of retouched edges to combined points and scrapers is 1.5 : 1 for both levels, the morphological structure of the unifacial toolkits (points and scrapers combined) shows some differences between levels (Table 20-14). The proportional occurrences of simple, double, and convergent tools are basically equal in Level IV/2, while in Level V, simple tools dominate. Obviously, such differences might be related to the distinct tool reduction models used in the two levels. On the other hand, it may merely reflect small sample sizes.

The overall morphological structure of the toolkits is quite similar (Table 20-15). Taking into account that bifacial tools are a little better represented in Level IV/2 (11.8%) than in Level V (8.8%), simple tools (a single retouched edge) and complex tools (two or more retouched edges) have almost the same proportions in each level.

Semi-exhausted tools occur in almost equal proportions (46.7% and 46.2%) in both levels (Table 20-11). There are, however, some differences in the proportions of tools that were not exhausted: 7.7% in Level V, as opposed to 20.0% in Level IV/2. There are no differences between assemblages in the kind of tools that were not exhausted. Most of these are simple tools: 5 of 6 in Level IV/2, and all in Level V. Evidently, convergent tools tended to be both more heavily retouched and more extensively used than were the simple tools.

Exhausted tools are relatively common, although there are some differences between assemblages. In Level V there are proportionately more (46.2%), than in Level IV/2 (33.3%). More than half of the exhausted tools in each level are convergent (Table 20-11).

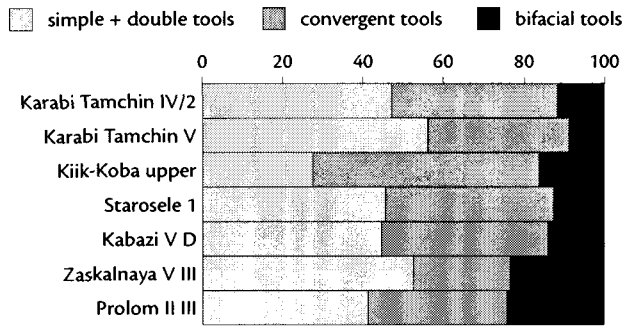

Figure 20-13—Karabi Tamchin Levels IV/2 and V in the context of the Crimean Micoquian.

TABLE 20-17
Karabi Tamchin Levels IV/2 and V in the context of the Crimean Micoquian†

	Karabi Tamchin L. IV/2	*Karabi Tamchin L. V*	*Kiik-Koba, upper*	*Starosele L. 1*	*Kabazi V L. D*	*Zaskalnaya V L. III*	*Prolom II L. III*
Simple+double tools	47.1	56.1	27.5	45.3	44.6	52.5	41.1
Convergent tools	41.2	35.1	56.2	41.5	41.3	23.8	34.4
Bifacial tools	11.8	8.8	16.3	12.3	14.1	23.6	24.4
Ilam	18.2	20.5	11.6	17.6	7.6	5.4	7.0
IF large	55.3	39.0	41.9	45.7	49.9	44.5	40.4
IF strict	31.6	16.9	21.9	42.7	24.5	26.7	26.0

†Data from: Chabai and Marks 1998; Stepanchuk 1993; Yevtushenko 1998b.

Thus, the majority of points and scrapers in both levels are invasively retouched, semi-exhausted, or exhausted. Complex tools account for more than half of all tools (62.5% in Level IV/2 and 52.1% in Level V). If the degree of tool retouch reflects the degree/duration of their use, then the high percentage of invasively retouched exhausted tools, as well as the large proportion of complex tools in each level, might point to a similar strategy of tool exploitation.

Typological variability within the Crimean Micoquian defines three facies: the Staroselian, the Kiik-Koba, and the Ak-Kaya. All have the same bifacial technology and similar tool-kits, differing mainly in the proportional occurrences of different tool classes (Chabai and Marks 1998:366–367). On the morphological level, there are larger distinctions among the proportional occurrences of bifacial tools, convergent tools, and simple tools, but even these represent continua rather than sharp breaks (Marks and Chabai in press).

In order to compare the Crimean Micoquian assemblages of Karabi Tamchin with other Crimean Micoquian assemblages, several occupations were selected to represent all facies (Table 20-17): Staroselian (Starosele Level 1 and Kabazi V Complex D), Ak-Kaya (Zaskalnaya V Level III and Prolom II Level III), and Kiik-Koba (Kiik-Koba upper level).

The comparison with the Karabi Tamchin assemblages indicates that Level IV/2 is closest to Starosele Level 1, while Level V is technologically similar to all Crimean Micoquian assemblages (Table 20-17). The typological characteristics and morphological structures of Levels IV/2 and V have similarities both with the Staroselian (Starosele Level 1, Kabazi V Complex D) and with the Ak-Kaya (Zaskalnaya V Level III, Prolom II Level III). The assemblage of Level IV/2 has a low percentage of points (11.4% of the restricted type list), which is characteristic for the Ak-Kaya, but has a high percentage of convergent tools (41.2%) and a low percentage of bifacial tools (11.8%), which are not characteristic of the Ak-Kaya. The assemblage of Level V has a high percentage of points (25.0%), a characteristic of the Staroselian, but the percentage of convergent tools (35.1%) is closer to the Ak-Kaya facies at Prolom II Level III (Table 20-17, Figure 20-13).

Thus, assemblages of Level IV/2 and Level V of Karabi Tamchin exhibit typological and morphological characteristics intermediate between the Staroselian and Ak-Kaya facies. Both of the Crimean Micoquian assemblages of Karabi Tamchin are clearly typologically different from the upper level of Kiik-Koba, in spite of the fact that Kiik-Koba Cave is relatively close to Karabi Tamchin and is likewise far from quality raw material sources. On the other hand, the tool assemblage of the upper level of Kiik-Koba has small tools and blanks, the small size of which had been explained as the result of a quality raw material shortage (Bonch-Osmolowski 1940). Obviously, typological distinctions should be found in different strategies of raw material exploitation, as well as in different occupational patterns between Karabi Tamchin and Kiik-Koba.

The Pattern of Raw Material Exploitation

All the assemblages at Karabi Tamchin exploited the same sources of raw material. The main material in each level was a fine-grained grey flint, with minor amounts of local chert. The closest outcrops of quality flint that might have been used are situated about 25–30 km north of Karabi Tamchin. Thus, Karabi Tamchin was further from raw material sources than other Middle Paleolithic sites on the Crimean Peninsula. Obviously, the shortage of quality raw materials was a serious problem for those occupying the site. This flint deficit is reflected by the following observations: (1) the percentage of tools is extremely high; (2) there are more tools than debitage; (3) the majority of blades, flakes, and tools are small; (4) all kinds of blanks, including chips, broken flakes, resharpening and trimming elements were used in tool production; (5) cores are rare and are small and exhausted; and (6) a good percentage of the bifacial and unifacial tools are also exhausted. In addition, the use of local coarse-grained cherts also reflects the shortage of quality raw material. Thus, although two different industries are present at Karabi Tamchin, both show the same effects of raw material scarcity.

Since there is little evidence of primary flaking in the Karabi Tamchin assemblages, the initial flint raw material reduction took place off-site. More than half of the flint blanks in each assemblage are without cortex. Although some of them do have a bit of dorsal cortex, there are few true primary elements. This indicates that, in all assemblages, imported pieces of raw material still had some cortex. The long distance to sources of flint required that pieces chosen for cores and bifacial preforms were relatively small. Obviously, core preforms and/or bifacial preforms were first prepared at flint outcrops and only then were transported to the site. The further reduction of such cores and/or preforms to make blanks for tool production took place on site.

In order to estimate the degree of primary flaking intensity, a ratio of all blanks to cores is used. For each assemblage at Karabi Tamchin, this ratio is fairly low (Table 20-12). Taking into account that Crimean

Micoquian assemblages used both blanks from core reduction and by-products of bifacial tool thinning in tool production, a ratio of all blanks to cores plus bifacial tools was calculated (Table 20-12). Despite the inclusion of both sources for blanks, the ratios are still low (Table 20-12). Thus, it is clear that cores and bifacial preforms produced few blanks.

The percentages of tools are extremely high in each assemblage (Table 20-12), as is the ratio of tools on blanks to cores plus bifacial pieces (Table 20-12). Given these indices, it is clear that a significant number of tools were made off-site. On the other hand, since in all assemblages a large proportion of regular retouched unifacial and bifacial tools are exhausted through resharpening and rejuvenation, it might suggest intensive and relatively long usage. Clearly, many such tools were left on-site, and additional tools were made on fresh blanks to replace exhausted ones. Logically, some of those new tools also might have been exported to other hunting stations.

There is a simple denticulate in Level II/2 and a simple concave scraper in Level IV/2 made on dark grey flint with greenish patina; each is unique for its level. These tools are invasively retouched, but their retouched edges have no patina, while both dorsal and ventral surfaces are covered by it. As a rule, such patina indicates an ancient age. On the other hand, it is important to note that the denticulate is made on a bifacial trimming flake and the scraper on a *débordant* blade. Bifacial thinning blanks are not part of the Levallois technology of Level II/2, while the *débordant* blade is not characteristic for the Micoquian technology of Level IV/2. Probably, both blanks were scavenged from some other occupations with different technologies. Given the distance to raw material sources, these pieces may indicate that "tool/blank scavenging" was used (Kuhn 1995). Thus, long-distance transport of raw materials suggests that lithic procurement strategies were likely embedded in the subsistence strategy.

All assemblages of Karabi Tamchin indicate low occupational density because of relatively small numbers of artifacts per cubic meter (Table 20-12). Thus, all levels appear to represent short-term occupations. Obviously, occupation of Level V, which has a higher density of artifacts, might have been either a relatively longer occupation or several different short occupations.

The Crimean Middle Paleolithic occupations have been divided into ephemeral stations, short-term hunting stations, short-term hunting camps, and base camps (Chabai and Marks 1998; Chabai et al. 2000; Marks and Chabai 2001). By definition, ephemeral stations reflect killing-butchering sites with limited core reduction activity and on-site and/or off-site tool production. Short-term hunting stations are differentiated from ephemeral stations mainly by the presence of hearths or other kinds of fire. Short-term hunting camps exhibit evidence for more varied activities than do hunting stations, as well as having a higher density of artifactual and faunal remains. There should be evidence of primary and secondary butchery of hunted animals (represented by several steppe and forest species), the use of fire, and a diversified production/use/discard sequence of lithic remains. Base camps, in fact, consist either of a series of short-term or long term hunting camps that are not stratigraphically distinct.

TABLE 20-18
Karabi Tamchin and Crimean Middle Paleolithic sites: lithic variability by occupation†

	Tools %	*Blanks : Cores*	*Tools : Cores*	*Density*	*Pattern of Occupations*
Karabi Tamchin Level II/2	54.4	23.0 : 1	12.3 : 1	41.2	short-term hunting stations
Karabi Tamchin Level III	54.6	19.2 : 1	9.4 : 1	47.6	
Karabi Tamchin Level IV/2	67.2	31.6 : 1	19.3 : 1	48.8	
Karabi Tamchin Level V	66.5	no cores	no cores	98.0	
Prolom II Level III	40.7	23.1 : 1	8.5 : 1	31.4	
Kabazi II Level II/1A-II/4	19.9	23.6 : 1	4.9 : 1	145.8	ephemeral stations
Kabazi II Level II/5-II/7	14.1	30.9 : 1	4.4 : 1	239.9	
Kabazi II Level II/7F8-II/8	14.8	18.3 : 1	2.7 : 1	232.8	
Shaitan Koba Level upper	12.4	29.8 : 1	3.8 : 1	313.1	short term hunting camps
Shaitan Koba Level lower	11.8	41.7 : 1	4.7 : 1	239.6	
Starosele Level 1	28.5	63.8 : 1	8.5 : 1	256.0	
Kabazi V Level D	12.8	96.5 : 1	18.4 : 1	56.7	
Kiik-Koba Level upper	16.0	95.2 : 1	15.2 : 1	>372.1	
Zaskalnaya V Level III	24.6	69.2 : 1	13.5 : 1	692.7	base camp (?)

†Data from Chabai and Marks 1998.

To compare the Karabi Tamchin occupations with those from other Crimean Middle Paleolithic sites, a number of different occupations were chosen, which have already been used for typological and technological comparisons (Table 20-18).

The occupations of Levels II/2 and III have the lowest artifact densities among the WCM assemblages (Table 20-18). Moreover, Levels II/2 and III have a much higher percentage of tools and the highest tool to core ratio, in comparison to Kabazi II Unit II and Shaitan-Koba upper and lower levels (Table 20-18). Obviously, both WCM assemblages from Karabi Tamchin reflect activities that differ from the other Western Crimean Mousterian assemblages.

For instance, all assemblages of Kabazi II Unit II are ephemeral stations close to a raw material source with on-site core reduction and on-site tool production. The assemblage of Shaitan-Koba upper level also has a lower proportion of tools and a higher density of artifacts. The assemblage of Shaitan-Koba lower level is similar, although the blank to core ratio is much higher than in the upper level (Table 20-18). However, Shaitan-Koba is situated in the Bodrak River Valley, which is extremely rich in quality flint, and both of its assemblages reflect on-site tool production from those nearby raw material sources.

The occupational characteristics of Levels II/2 and III appear similar to the assemblage from Prolom II Level III (Table 20-18), which has been defined as short-term hunting station (Chabai and Marks 1998: 364–365). It is important to note that Prolom II is situated relatively far from good quality flint (10–15 km) and so there was import of raw materials, as well as on-site and off-site tool production (Stepanchuk 1993a). Thus, the occupations of Karabi Tamchin Levels II/2 and III might be also be defined as short-term hunting stations that utilized long distance raw material transport. As such, they represent the first short-term hunting stations among known Western Crimean Mousterian occupations.

The assemblages of Levels IV/2 and V display occupational characteristics of short-term hunting stations, as noted for the Prolom II Level III assemblage. Also, the assemblage of Kabazi V Complex D, defined as a short-term hunting camp, has a similar artifact density and tool to core ratio, although the percentage of tools and the ratio of blanks to cores are significantly higher than in Levels IV/2 and V at Karabi Tamchin (Table 20-18). On the other hand, the distinction between terms such as short-term hunting station and short-term hunting camp have questionable meaning and seem to depend to a large degree on raw material proximity. The site of Kabazi V is situated 2–6 km from raw material, while quality raw materials were transported to Karabi Tamchin from 25–30 km away. Thus, both the Crimean Micoquian and the Western Crimean Mousterian assemblages of Karabi Tamchin site exhibit the same occupational pattern of short-term hunting stations.

The faunal remains do not conflict with the archeological data. The fauna from the Karabi Tamchin occupations included very small numbers of individuals of both steppe (horse, bovid, saiga, reindeer) and mountain forest (red deer, chamois) species (Burke, Chapter 16). Among the faunal remains, as well as among stone artifacts, the frequency of burned pieces indicates the presence of hearths or fireplaces during the occupations of Levels III, IV/2, and V. Burned bones are absent from Level II/2, but several flints exhibit traces of fire. The analysis of faunal remains indicates a late summer/autumn season for the Karabi Tamchin occupations. The taphonomic signatures of Levels II/2 and III are limited processing of bone, notably less evidence of burning, and a more marked presence of carnivores, which may indicate short-term, single-season human occupations. In Levels IV/2 and V, evidence of carnivore activity is more restricted and bone processing more intensive, reflecting either longer-term occupations or occupation during a different season. The relatively low density of artifacts per cubic meter in each level reflects the low density of site occupations. Obviously, these assemblages were left by small human groups over short periods. Thus, both the archeological and faunal data indicate that these occupations were seasonal short-term hunting stations, oriented to non-selective hunting, possibly encounter-based. Such a subsistence strategy was connected with highly mobile human activities. As shown for the Middle Paleolithic sites of Les Canalettes (France) and Borisovskoe Gorge (northwest Caucasus), both situated in mid-altitude mountain regions, the catchment area for successive occupations was about a 20–25 km radius (Meignen and Brugal 2001; Hoffecker and Baryshnikov 1998). If this interpretation is applied to Crimea, the Karabi Tamchin occupations must have been at the edge of such a catchment area, because raw material sources are 25–30 km distant. Several Middle Paleolithic sites, such as Adji-Koba, Kosh-Koba, Chagorak-Koba, and Buran Kaya III, are situated no more than 10–15 km from Karabi Tamchin. Some of these sites (Adji-Koba lower level, Kiik-Koba upper level, Buran Kaya III Layer B) have Micoquian assemblages typologically, technologically, and structurally similar to those from Levels IV/2 and V. It seems very possible that all these sites might represent an asynchronous chain of Micoquian hunting camps in the Crimean highlands.

Thus, all the Karabi Tamchin assemblages have similar patterns of raw material exploitation and occupational structure, although they belong to two different industries. It seems clear that the conditions of life in the mountain region, far from raw material sources, required a similar adaptation. It is important to note that the Crimean Micoquian

assemblage of Kiik-Koba upper level, the situation of which is comparable to Karabi Tamchin, exhibits significant morphological and occupational pattern differences. Given its occupational characteristics, Kiik-Koba upper level might represent a base camp (Chabai and Marks 1998) or some specific kind of short-term hunting camp (Chabai et al. 2000). The associated faunal remains include a relatively long list of species, which were impacted to a significant degree by carnivore (hyæna) activity. The specific rockshelter conditions of sedimentation did not deposit sterile lenses between the remains of repeated hunting visits. Obviously, the high density of artifacts per cubic meter is a result of a series of short-termed hunting camps mixed by natural and/or artificial processes.

Conclusions

The Karabi Tamchin rockshelter is the first known stratified multi-level site in the Crimean highlands. There are four occupation levels, two each of Western Crimean Mousterian (Levels II/2 and III) and Crimean Micoquian (Levels IV/2 and V).

The identification of raw material sources available to prehistoric populations is often somewhat probabilistic in Crimean Middle Paleolithic investigations, because most sites are situated in the Internal and External Mountain Ridges, both of which are extremely rich in high quality flint. In the case of Karabi Tamchin, located in the Main Ridge of the Crimean Mountains where there are no flint sources, the closest outcrops of quality raw material are 25–30 km away. The local raw materials, such as chert, could not wholly satisfy Middle Paleolithic tool makers because of its relatively low quality. The remoteness of quality raw materials affected all lithic assemblages at the Karabi Tamchin site. The influence of long distance raw material transport is seen both in the organization of raw material exploitation and in the specific occupation pattern.

These studies at Karabi Tamchin finally provide a basis with which to reject the theory of the so-called "Kiik-Koba Mousterian culture" proposed by Gladilin (1976) and developed by Stepanchuk (1991, 1993b). According to this theory, the small size of tools was a specific cultural feature noted at several sites (Kiik-Koba upper, Prolom I upper and lower levels), which therefore reflected a "paleo-ethnological tradition." As shown by the typological and technological analyses of the Karabi Tamchin occupations, the industrial characteristics of the lithic assemblages, including tool size, are directly dependent upon proximity to raw materials. All assemblages exhibited small tool dimensions, but differed in typological characteristics from the Kiik-Koba upper level. Moreover, the assemblages at Karabi Tamchin are quite different from the Kiik-Koba, both typologically and technologically.

Both archeological and faunal investigation clearly show that all occupations of Karabi Tamchin are short-term season hunting stations, dependent upon raw material importation, and oriented to non-selective, possibly encounter-based, hunting.