NATIONAL ACADEMY OF SCIENCES OF UKRAINE
INSTITUTE OF ARCHAEOLOGY
CRIMEAN BRANCH

UNIVERSITY OF COLOGNE
INSTITUTE OF PREHISTORIC ARCHAEOLOGY

Palaeolithic Sites of Crimea,
Vol. 1

KABAZI II:
LAST INTERGLACIAL OCCUPATION, ENVIRONMENT & SUBSISTENCE

Edited by
Victor Chabai, Jürgen Richter and Thorsten Uthmeier

Simferopol – Cologne
2005

Table of Contents

Chapter

7

Saving the Stock to be Prepared for the Unexpected. Transformation of Raw Material at the Middle Paleolithic Site of Kabazi II, Level V/1

Thorsten Uthmeier

Stratigraphical Position and Distribution of Finds

Archaeological level V/1 of Kabazi II is embedded in the uppermost part of geological Stratum 13A and consists of a thin, loose scatter of lithics and faunal remains that is separated from the underlying archaeological level V/2, as well as from the overlying level IV/4, by 5 cm to 10 cm thick sterile sediments. The excavated area measures 23 m^2 and is situated immediately behind a huge limestone block that was – for the most part – responsible for the site formation process by trapping colluvial sediments and debris which would otherwise have been transported further down slope. Stratum 14A, below the strata discussed here, is the humus (A1) horizon of a well developed humiferous soil, Stratum 14B. The reddish colour and high clay content of Stratum 14B suggests that the pedogenesis took place under warm, interglacial conditions (Gerasimenko, Chapter 2, this volume). The interglacial age for this soil formation is further strengthened by the presence of *Helix sp.*, and high ratios of boreal pollen (Gerasimenko, Chapter 2, this volume). In Stratum 14B, a vegetation of south-boreal forest type dominates, while Stratum 14A, with a more open forest-steppe vegetation, indicates the end of the interglacial conditions. While the pedogenesis of Stratums 14A and 14B points to an interruption of colluvial sedimentation, Stratum 13A is a soil colluvium which corresponds to a phase of low stability of the slope (Gerasimenko, Chapter 2, this volume). According to pollen analysis, the formation of this colluvium correlates with a severe cooling at the very beginning of the last glaciation.

However, since the last Interglacial, the landscape in the immediate vicinity of Kabazi II has undergone far reaching changes that have also influenced the site formation process. Beneath the site, three terraces belonging to the Alma River document a severe down cutting of the riverbed. The top of the oldest terrace is situated 60 m above the present day valley bottom and only 20 m below the lowermost archaeological levels of the Kabazi II stratigraphical sequence. Geological data suggests that the Alma River did not cut deeper into the landscape prior to OIS 4 (Chabai, Marks and Monigal 1999, 228; Chabai 2004c, 206). This view is supported by the analysis of local malacofauna (Mikhailesku, Chapter 4, this volume) which indicates falling ground water levels at the beginning of OIS 4.

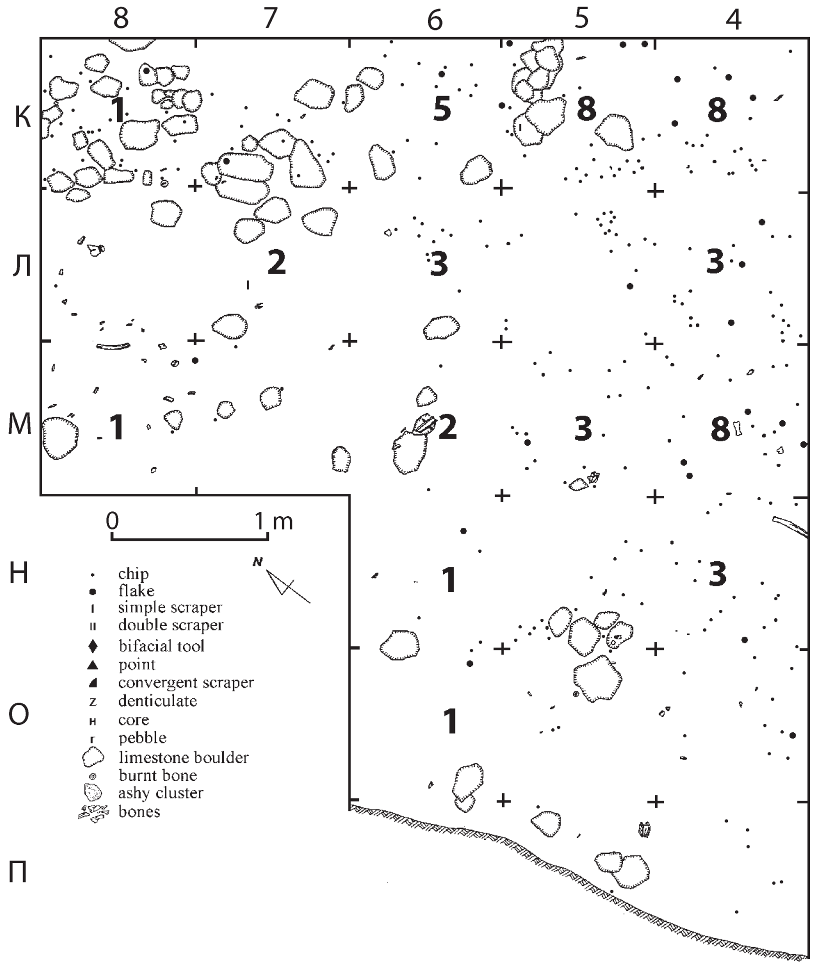

Fig. 7-1 Kabazi II, level V/1: Distribution of faunal remains, limestone blocks and artefacts from 19 workpieces on the living floor.

Consequently, Kabazi II originally was situated near the river bank, and flooding of the Alma could have reached the excavated area. While the lower archaeological levels of Unit V show no sign of activity connected with alluvial dynamics, these were indeed found in level V/1 to V/2A. In some areas of these archaeological levels, surfaces were wavy, and depressions were filled with sandy sediments. Archaeological remains including chips were found mainly in clusters and separated by sterile areas. Although erosion was not strong enough to remove all archaeological remains, any interpretation of the lithic assemblage must consider that finds from some areas may have been washed away, whereas in other parts of the excavated area some lenses have remained more or less untouched.

Artefacts large enough to be sorted into raw material units account for 54 pieces, most of these being larger than chips. In the case of 50 pieces, their exact position was measured (Fig. 7-1). Theses artefacts come mainly from three clusters, one in sq. 5K, one in 4K, and one in sq. 4M. All are situated near the edges of the trench. Rising and falling water levels of the Alma River might be an explanation for the observation that the southern and south-eastern parts of the excavated area, e.g. square lines N and O as well as sq. 8M and 7M, are more or less void of artefacts. Indeed, it is this section of the excavated area that is oriented towards the Alma River. A diagonal line projected from sq. 8K to sq. 4H separates areas with low densities of finds from those with higher amounts of artefacts. This boundary possibly indicates the uppermost shoreline of the river at the time of settlement. Some burnt artefacts found in the assemblage of Level V/1 belong to a fireplace that was situated near the limestone block and destroyed by water, or is still to be found out of the excavated area.

Typological and Technological Features

A total of 54 artefacts were large enough to be included in our investigation of raw materials. Of these, 23 artefacts show a modification of their lateral edges (Fig. 7-2). Taken into account that flooding of the Alma River played an important role in the formation process of Level V/1, it is no surprise that 15 pieces with irregular retouch dominate. In most cases, these modifications are best explained by post-depositional movements (e.g. Fig. 7-3, *7*, Fig. 7-5, *6*, *12*). However, there are others which have a lateral retouch consisting of a line of short, but regular negatives which stretch over a considerable part of their edges. The retouch on these pieces is most probably connected with short-term usage of formerly unretouched blanks (e.g. Fig. 7-3, *5*, *9*, Fig. 7-4, *7*). Among eight formal tools, five are side scrapers with one working edge (Fig. 7-3,*8*; 7-4,*1*,*8*; 7-5,*5*), and three were classified as notches (Fig. 7-5,*1-2*,*13*). In addition, two artefacts indicate intensive use or rejuvenation of formal tools. In one case, a broken tool tip originates from a scraper formed by ventral retouch (Fig. 7-5,*17*). Another artefact is a rejuvenation flake that removed part of a retouched working edge of a formal tool of unknown shape (Fig. 7-4, *5*). Generally speaking, there is no preference in the selection of blanks for formal tools. With simple flakes, flakes from surface shaping, and crested flakes, a whole variety of blank types was selected for formal tools. At least within the assemblage which has survived the natural site formation process, there would appear to be a considerable shortage of blanks. This assumption is based upon the observation that irregular outlines dominate among formal tools, a flake with Siret (false burin) breakage (Fig. 7-5,*5*) and a crested flake (Fig. 7-4,*8*) were used for the manufacture of formal tools, and – according to use wear retouch – even a broken preform was used (Table 7-1). The preform mentioned above (Fig. 7-3, *1*) shows that surface shaping was known as a concept for blank production. The fact that the surface shaping started with plan negatives on the lower surface is typical for the production of plano-convex bifacial tools of the "Crimean Micoquian". It is likely that the piece was abandoned because the regulation of a lateral breakage (in the course of initial preparation?) of the large cortical flake used as raw piece would not have led to satisfactory results. Judging from numerous flakes with convex lateral profiles, lipped striking platforms, less pronounced or no bulbs, and absence of bulbar scars, surface shaping of raw nodules or partly decorticated preforms took place within the excavated area.

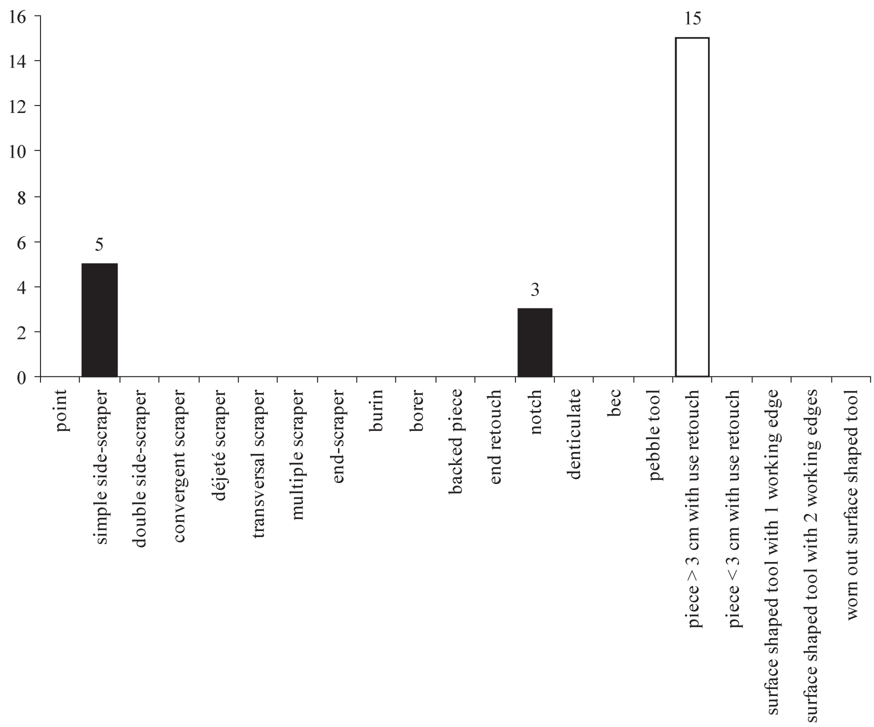

Fig. 7-2 Kabazi II, level V/1: Frequency of tools (black bars indicate formal tool classes).

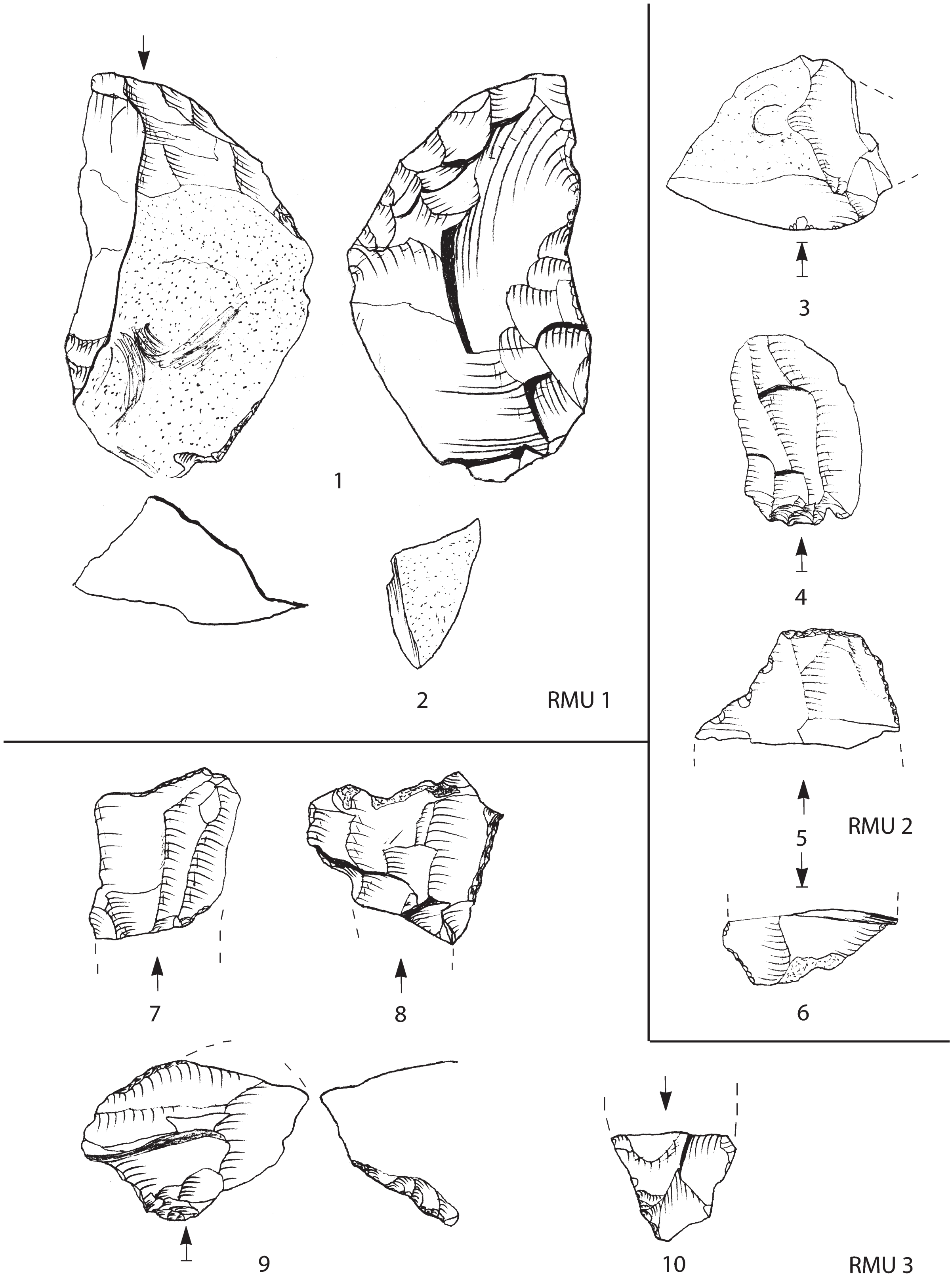

Fig. 7-3 Kabazi II, level V/1: Artefacts in raw material units.

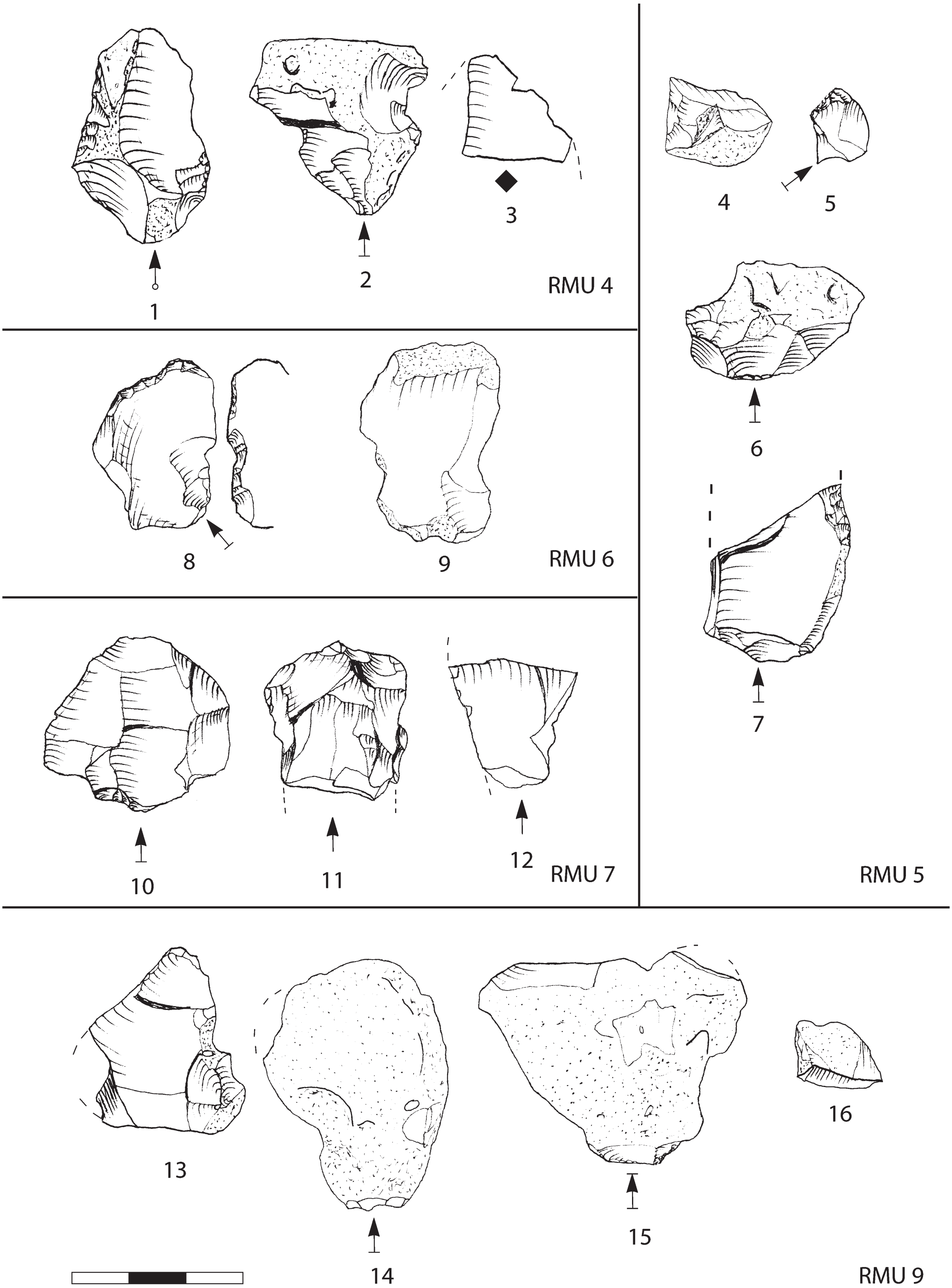

Fig. 7-4 Kabazi II, level V/1: Artefacts in raw material units.

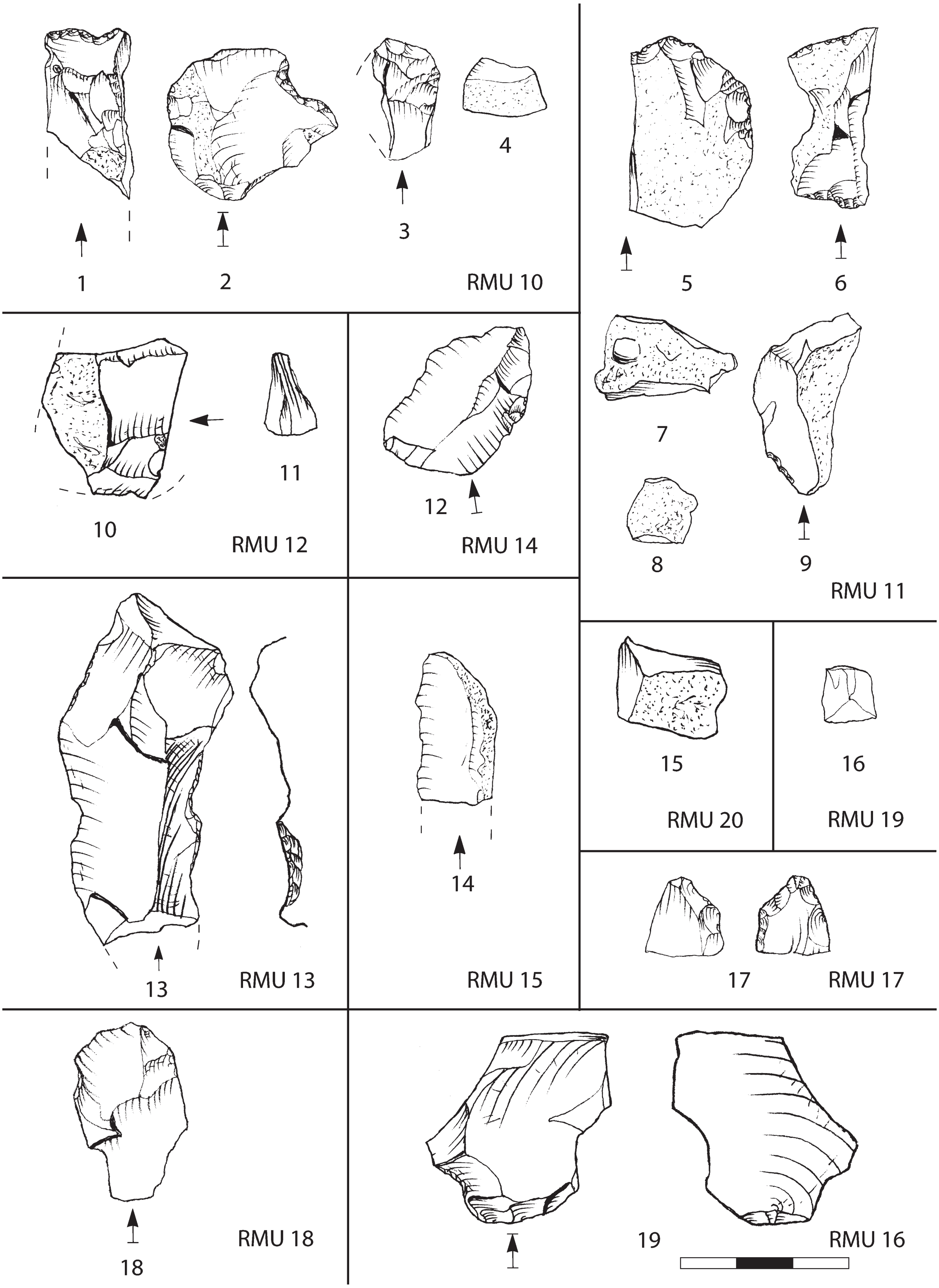

Fig. 7-5 Kabazi II, level V/1: Artefacts in raw material units.

However, there are also flakes with straight lateral profiles and pronounced bulbs and bulbar scars which were detached by direct hard hammer percussion (Fig. 7-6). Although part of them almost certainly stem from initial preparation of surface shaped preforms, a core-like piece (Fig. 7-4, *13*) shows that ad-hoc flaking of simple cores was also practiced. But still, no dorsal scar pattern on flakes was found that would indicate the control of distal and / or lateral convexities. If at all, flaking surfaces of cores were flaked without initial preparation, but not in the frame of any distinct concept or method. Finally, a Kombewa flake (Fig. 7-5, *14*) was struck off-axis from the ventral surface of a large flake. From the same surface, at least one additional large flake had been previously detached, possibly in order to produce a preform for a surface shaped tool. The observation that most blanks used for formal tools are partly covered by cortex again points to surface shaping as the main concept for raw material reduction in level V/1. In contrast to the reduction of true cores, the production of surface shaped tools allows only low frequencies of large flakes. Due to the fact that preforms and surface shaped blanks become thin, and flaking angels tend to become steep, large flakes occur mainly during the initial phase of decortication, often done by direct hard hammer percussion, and initial soft hammer surface shaping. Afterwards, flakes from *façonnage* mainly comprise thin and short flakes with irregular dorsal scar pattern. If there had been a reduction of prepared cores of any kind, one would expect more regular flakes. All in all, the following working steps of raw material reduction were recognised:

1. Detachment of simple flakes by hard hammer percussion;
2. Flaking of the ventral surface of large flakes;
3. Detachment of flakes for the surface shaping of plan-convex bifacial preforms;
4. Modification of blanks produced during working steps 1 to 3;
5. Rejuvenation of formal tools.

Almost certainly, these working steps were all dedicated to the production of surface shaped bifacial tools, some of which were made on large flakes. Except for simple cores, there is no evidence for any other concept or method of flaking.

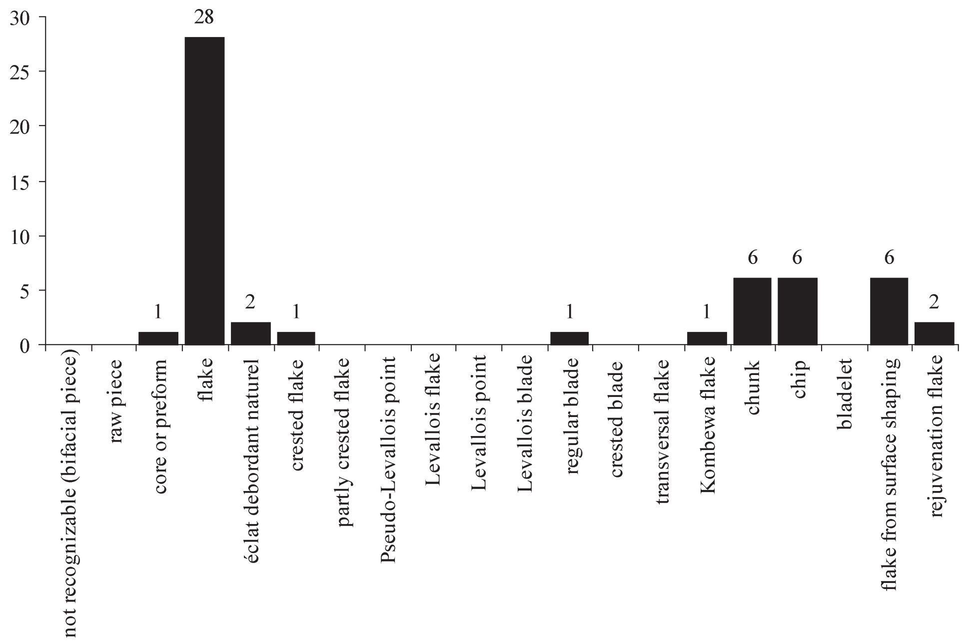

Fig. 7-6 Kabazi II, level V/1: Frequency of blanks.

RMU	tool class	blank
3	1 simple side scraper	flake from surface shaping
4	1 simple side scraper	simple flake
6	1 side scraper	flake detached off-axis along crest of a surface shaped preform
10	2 notches	1 simple flake, 1 flake from surface shaping
13	1 notch	blade-like flake
11	1 simple side scraper	flake with Siret fracture
17	1 tip of a scraper	unknown

Table 7-1 Kabazi II, Level V/1: Blanks selected for the production of tools in raw material units with formal tool classes. According to a continuous retouch that covers only minor parts of the lateral edges, several additional blanks were used, but not transformed into formal tools (e.g. a broken preform from RMU 1: Fig. 7-3, 1).

A Short Introduction into the Methods Applied: Sortation of Raw Material and Transformation Analysis

In general, the analysis of artefacts found at Palaeolithic sites is complicated by the fact that assemblages tend to be incomplete. Natural site formation processes, small excavation areas and the fact that mobile hunter-gatherers took part of their equipment with them to other sites, all contribute to the effect that many assemblages represent only a small part of the objects originally manufactured and used at a single site. Even if artefacts are found *in-situ*, refittings are often not very numerous, and at the same time lack artefacts needed to complete refitted flaking sequences. The number of refittings, as well as the number of artefacts missing to complete nodules can be taken as a scale to judge the degree of incompleteness of a given assemblage. Apart from erosion and small excavation areas, missing cores and tools may be interpreted as indicating human transport of items to other campsites. For many years, the sortation of lithic artefacts into raw material units is a method used to enlarge the data of refittings. A group of artefacts with a unique combination of raw material attributes is defined as being the result of the reduction of the same nodule. In the following chapters of this volume, we have combined a detailed sortation of raw material with a classification of these units referring to the completeness of the *chaîne opératoire* at the site under analysis (Richter 1997; Uthmeier 2004a). From a methodological point of view, all raw material units consisting of two or more artefacts from the same raw piece are treated as equivalent to refittings. These units are called "workpieces", because it is assumed that the discarded artefacts result from flaking activities on the site. They underwent a transformation within the excavated area. The transformation might represent the entire formal *chaîne opératoire* as defined by J.-M. Geneste (1985; 1988; 1990), or to the contrary only isolated work steps, e.g. the modification or the fracture of a tool. A second class of raw material units may consist of pieces without any counterpart with identical raw material attributes within the entire assemblage. These raw material units are called "single pieces". For one reason or another, these pieces were discarded without any transformation. Essentially, the classification of "transformation sections" is based upon the presence or absence of artefacts which are diagnostic for certain steps of the *chaîne opératoire*. The number of steps of the *chaîne opératoire* classified as being conducted within the excavated area results from the most initial and most final work step which is represented by one or more diagnostic artefacts, no matter if artefacts of intermediate work steps are present or not. For example, it is concluded that the combination of a cortical flake and a broken tool in one raw material unit indicates the complete reduction of a raw piece. A list of classes of transformation sections as well as the corresponding diagnostic artefacts is given in Table 7-2 (for raw material units with *debitage* only) and Table 7-3 (for raw material units that include *façonnage*). Table 7-4 gives a correlation between transformation sections and phases of the formal *chaîne opératoire* after J.-M. Geneste (1985; 1988; 1990).

Sortation of Raw Material Units

Among 54 artefacts, 20 raw material units were identified (for a description of the method applied see Uthmeier 2004a). One of these consists of nine patinated or burned pieces and was – together with most of the chips – classified as "sorting rest". This category also includes some "colluvial pieces" that were, according to V. Chabai (Chapter 1, this volume), transported in different quantities into the excavated area by natural processes, possibly from another, older site above Kabazi II. Because nothing can be said about their original fracture planes, these pieces were not included in the following considerations. The remaining 19 raw material units contain small numbers of artefacts, ranging between one piece and five pieces per unit (Fig. 7-7). All comprise artefacts made from Cretaceous flint. The colour of most fracture planes is grey, with differences in detail: while some are light-grey, others are brown-grey, dark-grey, or even brown. Bands parallel to the cortex are rare, as are schlieren, but many fracture planes show white to grey inclusions in different frequencies. Given the low diversity of macroscopic attributes, it was not always easy to distinguish between raw material units. In six cases, transitional combinations of attributes that might link two units were identified. Nevertheless, it was assumed that a distinction would best meet the prehistoric reality, rather than combining these units. Only one unit (RMU 9) with a brown to orange colour is an "exotic" raw material, it being rare in all archaeological levels from Kabazi II studied so far. Consequently, eleven raw material units with two or more artefacts are treated as workpieces (i.e., comprise artefacts originating from one nodule only). It is, of course, difficult to ascertain whether single pieces really had no counterpart in the excavated area, as additional pieces might have been removed in the past by the Alma River during periods of flooding.

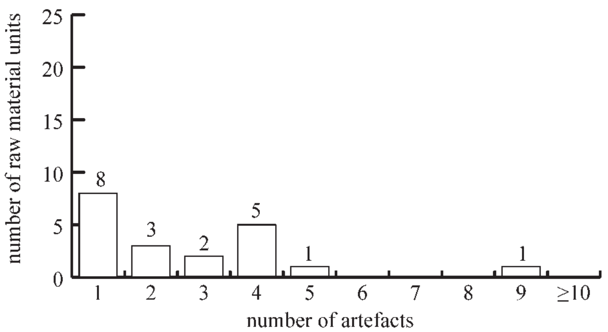

Fig. 7-7 Kabazi II, level V/1: Number of artefacts in raw material units.

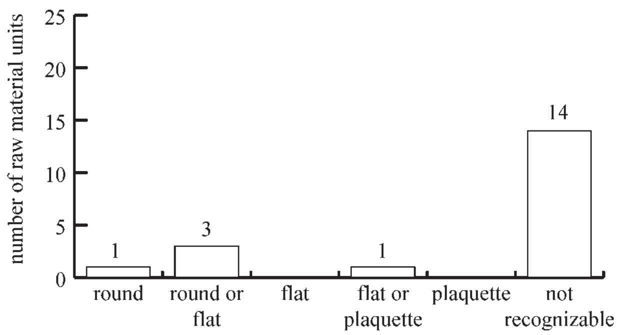

Fig. 7-8 Kabazi II, level V/1: Original shape of raw pieces before the transformation began. Possible shape of raw pieces is based upon cortical flakes and the assumption that each raw material unit represents a distinct nodule (workpiece).

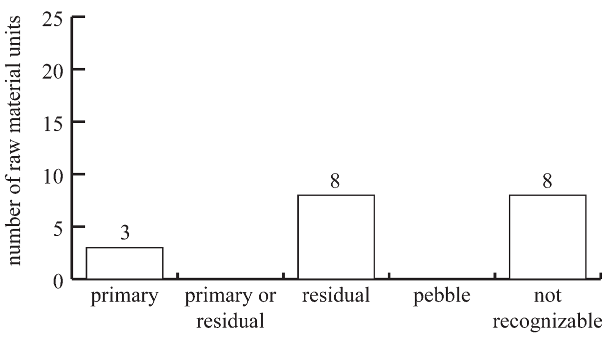

Fig. 7-9 Kabazi II, level V/1: Geological classification of raw pieces. Possible geological provenance of raw pieces is based upon cortical flakes and the assumption that each raw material unit represents a distinct nodule (workpiece).

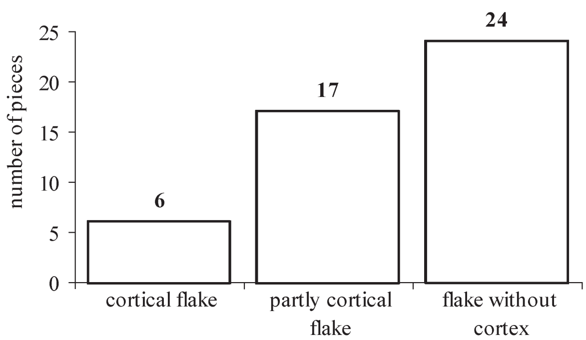

Fig. 7-10 Kabazi II, level V/1: Frequency of cortex on dorsal surfaces of flakes, measured in three broad classes.

N	transformation section	artefacts used as criteria for classification	explanation
1	**Tw** (Tool without transformation)	**formal tool**	dynamic object, imported into the site and discarded
	Bw (Blank without transformation)	**blank**	
	Cw (Core without transformation)	**core**	
	Nw (Nodule without transformation)	**raw nodule**	
	Ei (isolated functional End of a tool)	**flake from rejuvenation** (e.g. lateral sharpening flake), or **broken tool tip**	static object, flaked from or broken off an imported dynamic object, and discarded; the dynamic object (e.g. the tool) was exported
2	**TT** (Tool with corresponding tool Tip)	**flake from rejuvenation** or **broken tool tip**, combined with the corresponding formal **tool**	static object, flaked from or broken off an imported dynamic object, and discarded; the dynamic object (e.g. the tool) was also discarded
2 or more	**Mi** (isolated Modification)	**chips from modification** of working edge(s)	static objects, flaked from an imported dynamic object (e.g. the blank), and discarded; the tool was exported
	TM (Modification with corresponding formal Tool)	**chips from modification** of working edge(s), combined with the corresponding **formal tool**	static objects, flaked from an imported dynamic object (e.g. the blank), and discarded; the tool was also discarded
	Cc (correction of a Core)	fragments of simple **flakes** and/or **chunks**, combined with a core or not; no or **low amount of cortex**	static objects, flaked from an imported dynamic object (e.g. the core), and discarded; the core might have been discarded or exported
	Np (preparation of a Nodule)	fragments of simple **flakes** and/or **chunks**, combined with a tested raw piece or not; **high amount of cortex**	static objects, flaked from a dynamic object (e.g. the raw nodule), and discarded; the flaked raw piece might have been discarded or exported
	Cb (blank production from a Core)	**simple flakes**, **crested flakes**, chunks and/or **target flakes** (e.g. from Levallois or discoidal concept), combined with a core or not; no or **low amount of cortex**	dynamic and static objects, flaked from an imported dynamic object (e.g. the core); the core and part of the blanks might have been discarded or exported
	Nb (blank production from a raw Nodule)	**simple flakes**, **crested flakes**, chunks and/or **target flakes** (e.g. from Levallois or discoidal concept), combined with a core or not; **high amount of cortex**	dynamic and static objects, flaked from an imported dynamic object (e.g. the raw nodule); the core and part of the blanks might have been discarded or exported
	Cm (blank production from Core with subsequent modification)	**simple flakes**, **crested flakes**, chunks and/or **target flakes** (e.g. from Levallois or discoidal concept), combined with **flakes from rejuvenation** or **modification** and/or **formal tools**; the core might be present or not; no or **low amount of cortex**	dynamic and static objects, flaked from an imported dynamic object (e.g. the core), some of which are modified; the core as well as part of the blanks and formal tools might have been discarded or exported
	Nm (blank production from a raw Nodule with subsequent modification)	**simple flakes**, **crested flakes**, chunks and/or **target flakes** (e.g. from Levallois or discoidal concept), combined with **flakes from rejuvenation** or **modification** and/or **formal tools**; the core might be present or not; **high amount of cortex**	dynamic and static objects, flaked from a dynamic object (e.g. the raw nodule), some of which are modified; the core as well as part of the blanks and formal tools might have been discarded or exported

Table 7-2 Classes of transformation sections for raw material units with *debitage*, and their attributes.

N	transformation section	artefacts used as criteria for classification	explanation
1	**Tw/f** (Tool without transformation)	**surface shaped tool**	dynamic object, imported into the site and discarded
	Bw/f (Blank without transformation)	**flake from *façonnage***	
	Cw/f (preform without transformation)	**surface shaped preform**	
	Ei/f (isolated functional End of a tool)	**flake from rejuvenation** (e.g. lateral sharpening flake), <u>or</u> **broken tool tip** from surface shaped tool	static object, flaked from or broken off an imported dynamic object, and discarded; the dynamic object (e.g. the surface shaped tool) was exported
2	**TT/f** (Tool with corresponding tool Tip)	**flake from rejuvenation** (e.g. lateral sharpening flake), <u>or</u> **broken tool tip**, combined with the corresponding **surface shaped tool**	static object, flaked from or broken off an imported dynamic object, and discarded; the dynamic object (e.g. the surface shaped tool) was also discarded
2 or more	**Mi/f** (isolated Modification)	**chips from modification** of working edge(s) of a surface shaped tool	static objects, flaked from an imported dynamic object (e.g. the surface shaped blank), and discarded; the surface shaped tool was exported
	TM/f (Modification with corresponding surface shaped Tool)	**chips from modification** of working edge(s), combined with the corresponding **surface shaped tool**	static objects, flaked from an imported dynamic object (e.g. the surface shaped blank), and discarded; the surface shaped tool was also discarded
	Cc/f (Correction of a surface shaped tool)	**flakes from secondary *façonnage***, (with remnants of former working edge), combined with the corresponding (reduced) surface shaped tool or not; no or **low amount of cortex**	dynamic and static objects, flaked from an imported dynamic object (e.g. the surface shaped tool), and discarded; the surface shaped blank might have been discarded or exported
	Cb/f (production of a surface shaped blank from a preform)	**flakes from *façonnage***, combined with the corresponding preform or not; no or **low amount of cortex**	dynamic and static objects, flaked from an imported dynamic object (e.g. the preform); the surface shaped blank and part of the flakes might have been discarded or exported
	Nb/f (production of a surface shaped blank from a raw Nodule)	**flakes from *façonnage***, combined with the corresponding preform or not; **high amount of cortex**	dynamic and static objects, flaked from an imported dynamic object (e.g. the raw piece); the surface shaped blank and part of the flakes might have been discarded or exported
	Cm/f (production of a surface shaped blank from a preform with subsequent modification)	**flakes from *façonnage***, combined with **flakes from rejuvenation** or **modification** <u>and</u>/<u>or</u> a surface shaped **tool** and/or simple tool; the surface shaped tool might be present or not; no or **low amount of cortex**	dynamic and static objects, flaked from an imported dynamic object (e.g. the preform), some of which might be modified; the surface shaped blank or tool as well as part of the flakes and formal tools might have been discarded or exported
	Nm/f (production of a surface shaped blank from a raw Nodule with subsequent modification)	**flakes from *façonnage***, combined with **flakes from rejuvenation** or **modification** <u>and</u>/<u>or</u> a surface shaped **tool** and/or simple tool; the surface shaped tool might be present or not; **high amount of cortex**	dynamic and static objects, flaked from an dynamic object (e.g. the raw nodule), some of which might be modified; the surface shaped blank or tool as well as part of the flakes and formal tools might have been discarded or exported

Table 7-3 Classes of transformation sections for raw material units with *façonnage*, and their attributes.

		stage 0	stage 1	stage 2	stage 3
		acquisition of raw material	decortification, preparation	production of blanks/ target flakes	modification and use
diagnostic artefacts	blanks from core	raw nodule	indifferent flakes, flakes from the preparation of convexities	flakes removing convexities, crested flakes	resharpening flakes, chips from modification, broken tool tips, fragments of formal tools
	surface shaping		flakes from decortification (struck with hard hammer percussion)	flakes from facial retouch (struck with soft hammer percussion)	
Tw					
Bw					
Cw					
Nw					
Ei					X
TT					X
Mi					X
TM					X
Cc				X	
Np		X			
Cb			X	X	
Nb		X	X	X	
Cm			X	X	X
Nm		X	X	X	X

Table 7-4 Classes of transformation sections and their position within the formal *chaîne opératoire (*after Geneste 1985; 1988; 1990).

Some General Remarks on the Transformation of Raw Material

According to transformation analysis, eleven units with artefact frequencies between two and five pieces allow the reconstruction of the production of (surface shaped) blanks and/or modification (for information about the method of transformation analysis see Uthmeier 2004a). On the other hand, eight single pieces were discarded without any or with only minor flaking. Only four raw material units comprised artefacts with cortex that allowed the reconstruction of the original shape of the raw piece (Fig. 7-8). Prior to flaking, one raw piece had been round, three were round or round flat, and one was probably a plaquette. According to the preservation of cortex, three raw pieces came from primary raw material sources, while eight units were collected from residual sources (Fig. 7-9). At present, primary and secondary sources of Cretaceous flint are known from nearly every major river valley in the second range of the Crimean Mountains. Furthermore, one must assume that during the Pleistocene there were even more outcrops of primary or residual materials along the so called “flint belt”, still undiscovered by ourselves or destroyed after changes in the landscape. Nevertheless, the raw material flaked in level V/1 is probably not local. Outcrops along the Alma Valley are situated near today’s valley bottom and were not accessible at the time of settlement. Instead, it is more likely that part of the raw material used in level V/3 comes from the Bodrak valley, where the river had already cut deep into the landscape prior to interglacial times, and primary raw material sources were accessible at the time. We are not entirely certain whether the same applies for raw material units classified as coming from residual sources. Outcrops of residual raw materials are known predominantly from the eastern part of the Crimean Mountains, some 60 km from the Alma River (Uthmeier 2004a, Fig. 11-13). However, as previously mentioned, our present knowledge of the distribution of raw material sources is still somewhat limited, and given the abundance of raw material within the Crimean "flint-belt" (Demidenko 2004a, 115), it is perhaps more convincing to assume that residual raw pieces were collected from less distant sources.

At least a part of the material reached the excavated area as raw pieces, and underwent a phase of decortication. This is indicated by six cortical flakes and twelve flakes partly covered by cortex on their dorsal surface (Fig. 7-10). As it cannot be ruled out that artefacts might be missing due to the character of the natural site formation process, it is difficult to interpret conventional data when it comes to the amount of flaking that was done in the excavated area. A total of 24 flakes without any cortex show that flaking began after decortication, or indicate long reduction sequences reaching into the inner part of raw pieces. In this regard, transformation analysis enables a more precise estimation of flaking activities. However, single pieces, as well as raw material units only consisting of flakes from long transformation sections, but lacking the corresponding core and/or additional flakes, must be approached with caution. Again, it cannot be ruled out that the incomplete record of artefacts is due to the natural site formation process, rather than to human artefact transportation.

Transformation Analysis

In level V/1 of Kabazi II, three broad classes of transformation sections dominate the assemblage of single pieces and workpieces (Fig. 7-11; for basic data see Table 7-5):

1. Blanks and tools discarded without flaking (Bw, Tw: six cases);
2. Simple tools and surface shaped tools that were rejuvenated (Ei and Ei/surface, one case each);
3. Raw material units that represent the flaking of raw pieces (Nb, Nm: two cases) and preforms, cores or surface shaped blanks (Cc, Cb, Cm: nine cases).

Within this last group, which is predominant in the assemblage, there are only two units which comprise the inner part of a nodule: in RMU 9, a core-like piece (Fig. 7-4, *13*) attests the flaking of a simple flake core, whereas in RMU 1, a surface shaped

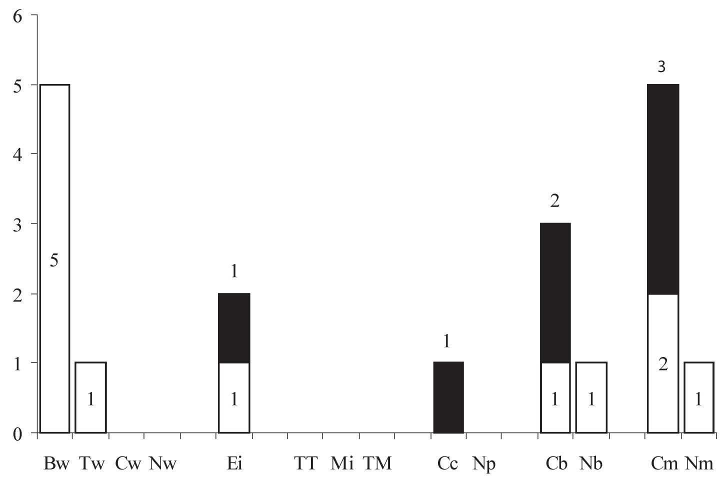

Fig. 7-11 Kabazi II, level V/1: Frequency of transformation sections (Bw = blank without transformation (within the excavated area), Tw = tool without transformation, Cw = core without transformation, Nw = nodule without transformation, Ei = isolated functional part of a tool, including resharpening flake, TT = broken tool with corresponding tip, Mi = two or more isolated chips from modification, TM = tool with corresponding chips from its modification, Cc = correction of a core, Np = preparation of a raw nodule, Cb = blank production from a core, Nb = blank production from a raw nodule, Cm = blank production from a core and modification of blank(s), Nm = blank production from a raw nodule and modification of blanks(s); white bars: *debitage*, black bars: */f = *façonnage*, indicated by flakes from *façonnage* and/or surface shaped tools).

blank (Fig. 7-3, *1*) points to surface shaping. According to the presence/absence of blank types from soft hammer percussion, surface shaping was the main focus of flaking activities and occurs in total in six units. The flaking of the remaining five units with hard hammer percussion only probably where also dedicated to the production of surface shaped preforms, but stopped after initial preparation. Speaking in terms of simple numbers, raw material units with blank production are small (Table 7-6): relatively long reduction sequences that include blank production (Cc/*, Nb/*, Cb/*, Cm/*, Nm/*) were reconstructed on the basis of two to five artefacts only. Without discussing raw material units in greater detail, it is difficult to judge whether this is the result of only minor flaking activities within the excavated area, or the result of an incomplete set of data due to the site formation process. Thus, for a better understanding of the classification of transformation sections, some raw material units will be described in greater detail below (compare also Fig. 7-12 and Fig. 7-13).

assemblage			data related to identification of imported item							on-site transformation and/or discard)												
Kabazi II, Unit V, Level 1			raw piece: phase 0		initially prepared or flaked piece: phases 1 or 2		inner part of flaked piece			production of blanks: phases 1 and 2					indifferent	modification and usage: phase 3				early discard		
raw material unit	weight (in g)	N	raw piece or chunk	cortical flake	flake partly covered by cortex	flake without cortex	core/preform/initially surface shaped blank	unknown blank (bifacially surface shaped piece)	imported item	flake	blade	trimming flake	core/preform/initially surface shaped blank	chunk	chip	simple tool	surface shaped tool	chip from modification	flake from rejuvenation or broken tool tip	raw piece	transformation section	evacuation > 3 cm
14	5	1				1			simple blank	1											Bw	
15	2	1			1				simple blank	1											Bw	
16	5	1				1			simple blank	1											Ei/f	
18	3	1				1			simple blank	1											Bw	
19	1	1				1			chunk					1							Bw	
20	3	1		1					simple blank	1											Bw	
13	21	1				1			simple tool							1					Tw	
17	2	1				1			simple tool										**1**		Ei	simple tool
2	27	4			2	2			preform	**4**											Cb	core
12	5	2			1	1			preform	**1**					**1**						Cb	preform
1	59	2	1	1					flake				**1**	**1**							Cb/f	
7	13	3				3			initially surface shaped blank	**3**											Cb/f	surface shaped blank
9	56	4	1	1	1		1		raw nodule	**2**			**1**	**1**							Nb	
3	22	4			1	3			preform	**3**						**1**					Cm	core
5	13	4	1		2	1			preform	**1**				**1**		**1**			**1**		Cm	core + simple tool
6	10	2			1	1			preform	**1**						**1**					Cm	core
4	11	3			2	1			preform	**2**						**1**					Cm/f	initially surface shaped blank
10	10	4			3	1			initially surface shaped blank	**1**				**1**		**2**					Cm/f	surface shaped blank
11	19	5		2	3				raw nodule	**3**					**1**	**1**					Nm	preform
8	25	9	1		1	2	5		sorting rest	**3**				**2**	**4**							
N **20**	**312**	**54**	**4**	**5**	**18**	**21**	**6**	**0**		**29**	**0**	**0**	**2**	**7**	**6**	**8**	**0**	**0**	**2**	**0**		

Table 7-5 Kabazi II, Level V/1: Data relevant for transformation analysis. The classification of transformation sections is conducted on the "workpiece-level". As workpieces are considered as refits, two or more artefacts made on the same piece of raw material and recovered from the excavated area are taken to represent the transformation of this raw material on site. For each raw material unit the most initial and the most final work step in the formal *chaîne opératoire*, as highlighted by the artefacts, are used to define the boundaries of a transformation section (an explaination of the different classes of transformation sections can be found in Fig. 7-13).

Initial preparation of raw nodules (Nb or Nm): RMU 9, RMU 11

RMU 9 consists of four artefacts (Fig. 7-4, *13-16*). Whereas a chunk (Fig. 7-4, *16*) comes from the regulation of the raw piece or was unintentionally detached in the course of flaking, two large flakes (Fig. 7-4, *14-15*) are covered by cortex on their dorsal surface. One of these (Fig. 7-4, *14*) shows small negatives from the preparation of the striking platform, while the other (Fig. 7-4, *15*) has an additional negative which was struck from a striking platform situated upon the opposite lateral edge of the raw piece. While the flakes point to the decortication of a raw piece, the core-like piece (Fig. 7-4, *13*) indicates that the reduction process went further, although no additional flakes were found in the excavated area. Conversely, the reduction of RMU 11 (Fig. 7-5, *5-9*) ended after initial preparation. All five artefacts that make up this unit are partly covered by cortex on their dorsal surfaces. A crested flake (Fig. 7-5, *6*) indicates that the raw piece was prepared at least on one lateral edge after part of the cortex had been removed. The removal of cortex itself is documented by two chunks (Fig. 7-5, *7-8*) and a cortical flake that was modified into a simple side scraper (Fig. 7-5, *5*).

Surface shaping from partly decorticated preforms (Cb/surface or Cm/surface): RMU 4; RMU 5

In RMU 4 (Fig. 7-4, *1-3*), two flakes are partly covered by cortex. One of them (Fig. 7-4, *2*) points to surface shaping. The other one, struck with hard hammer percussion, shows that the reduction began with initial preparation (fig. 7-4, *1*), while a small fragment without any cortex might stem from a later stage of surface shaping when cortex had already been completely removed (Fig. 7-4, *3*). The only piece with a regular outline was modified into a simple side scraper (Fig. 7-4, *1*). RMU 5 (Fig. 7-4, *4-7*) shows a comparable reduction sequence. As the aim of raw material sortation was to distinguish individual nodules, it is not accidental that RMU 5 includes not only a simple flake (Fig. 7-4, *6*) and a chunk (Fig. 7-4, *4*), but also a basal fragment of a formal tool (scraper) (Fig. 7-4, *7*) and a rejuvenation flake (Fig. 7-4, *5*). According to the logics of flaking, the rejuvenation flake was struck from the lost distal part of the latter formal tool, which therefore must have been a convergent scraper.

Surface shaping of surface shaped blanks (Cb/surface or Cm/surface): RMU 3, RMU 7

In some raw material units, e.g., RMU 3 (Fig. 7-3, *7-10*) and RMU 7 (Fig. 7-4, *10-12*), all artefacts can be explained as resulting from surface shaping of pieces without cortex and which, at the same time, had undergone a previous facial retouch. Some of the large flakes from surface shaping (Fig. 7-3, *9*; Fig. 7-4, *11*) were used to remove deep hinges which had occurred during previous working steps of the *façonnage*.

Correction of surface shaped blanks (Cc/surface): RMU 1

In RMU 1 (Fig. 7-3, *1-2*), the correction of a surface shaped blank is the only flaking activity that can be reconstructed. A chunk (Fig. 7-3, *2*) covered by cortex stems from the same nodule as a surface shaped blank (Fig. 7-3, *1*). The latter is a cortical flake with negatives of surface shaping on the ventral surface

Number of artefacts in raw material unit	RMU	transformation section
2	1, 6, 12	Cc/f, Cb/f, Cb
3	4, 7	Cm/f, Cb/f
4	2, 3, 5, 9, 10	Cb, Cm, Cm/f, Nb, Cm/f
5	11	Nm

Table 7-6 Kabazi II, Level V/1: Frequency of artefacts in raw material units (RMU) classified by transformation analysis as covering steps of the formal operational chain that are dedicated to the production of blanks (Cc = correction of core, Cb = blank production from decorticated piece, Cm = blank production from decorticated piece and modification of blanks, Nb = blank production from raw nodules, Nm = blank production from raw nodule and modification of blanks, */f = production of surface shaped tools by *façonnage*).

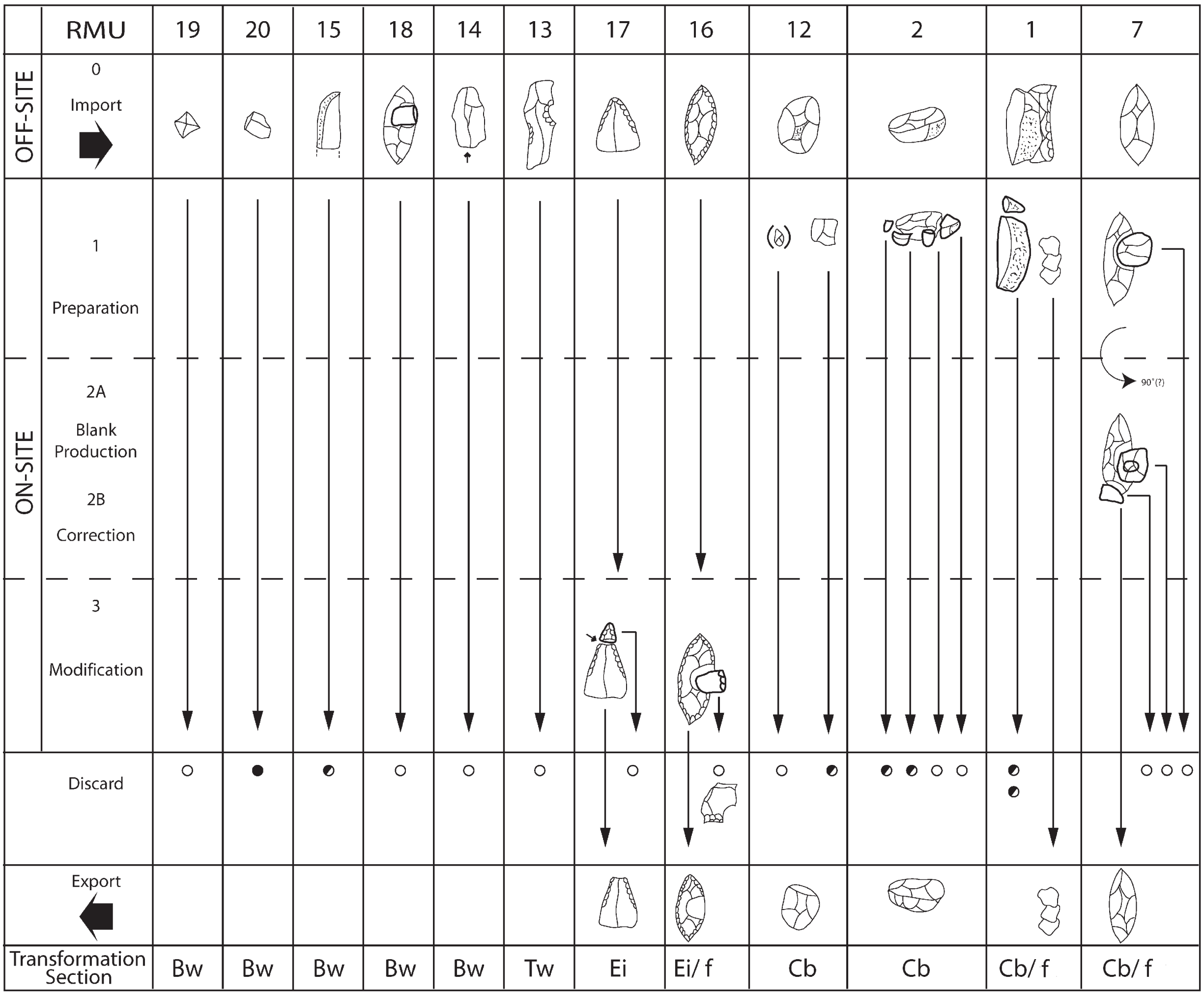

Fig. 7-12 Kabazi II, level V/1: Flow chart of the results of transformation analysis. For every raw material unit, the part of the *chaîne opératoire* reconstructed with the help of the discarded artefacts (transformation section) is depicted as conducted within the excavated area. Import and export refer to phases of the lithic reduction which left no traces among the lithic discard, or to artefacts missing in between the transformation section (abbreviations of classes of transformation sections are explained in Fig. 7-11; steps of the formal *chaîne opératoire* after Geneste 1985; 1988; 1990).

that were struck from a decorticated dorsal striking platform. The lateral break most probably occurred during initial preparation, and the point of breakage was used as a striking platform for the production of further negatives on the ventral side. At the same time, the fracture plane of the breakage cuts some negatives on the distal part of the dorsal surface. With the combination of an unfinished surface shaped blank and a chunk, RMU 1 fulfils the criteria for the transformation section "Cc/surface" ("correction of a core/a surface shaped blank). The origin of the chunk might go back to a regulation of the base of the surface shaped blank, at a time when a direct blow led to an uncontrolled break. However, since the pieces do not fit together, it must be assumed that additional flakes and/or chips were removed.

Rejuvenation of surface shaped tools: RMU 16

Due to the fact that the flake removed part of a lateral, bifacially retouched working edge as well as a considerable amount of a convex facial retouch, it is concluded that the only artefact of RMU 16 (Fig. 7-5, *19*) represents the resharpening of a bifacial surface shaped tool, or the usage of a bifacial tool as a core.

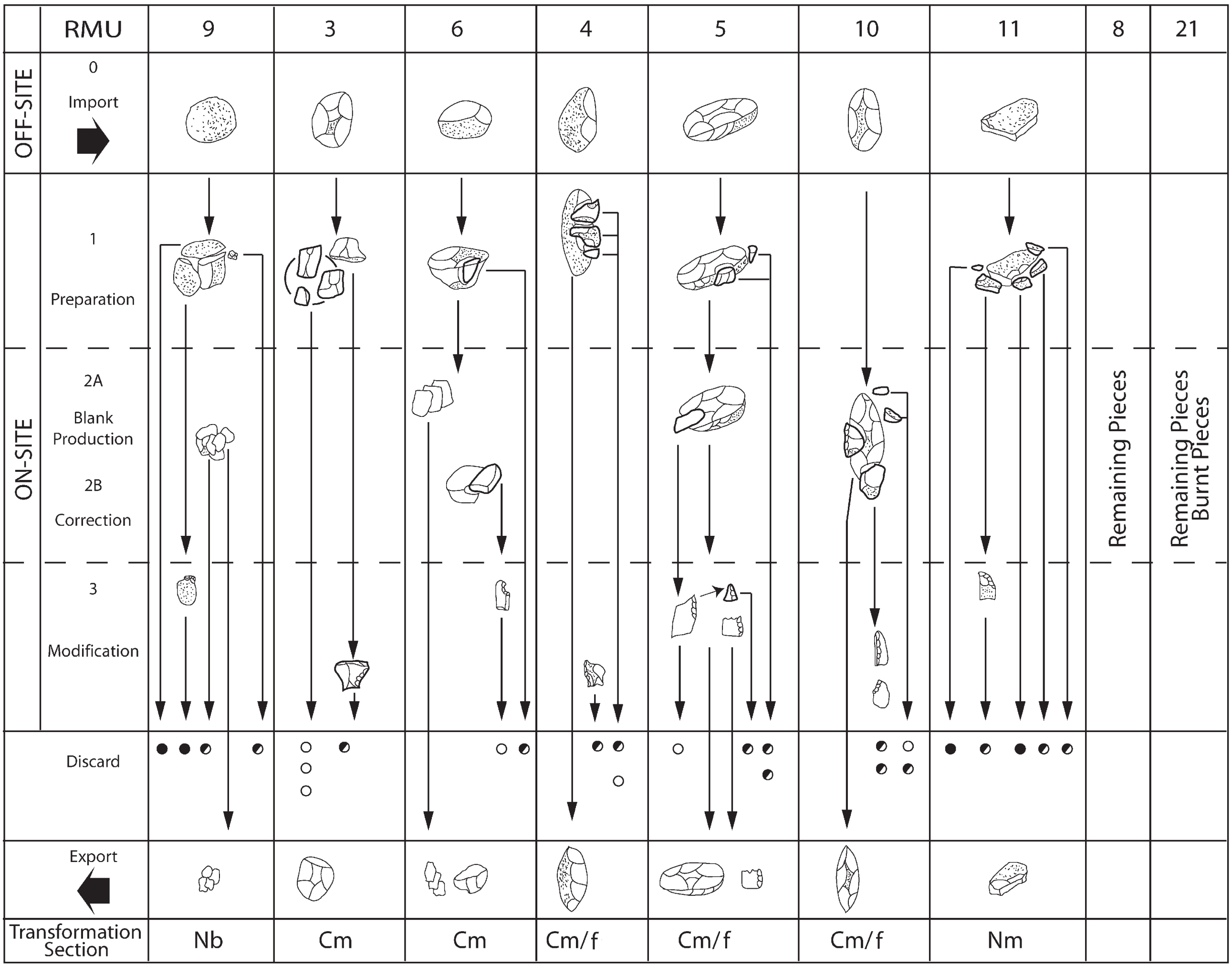

Fig. 7-13 Kabazi II, level V/1: Flow chart of the results of transformation analysis (cf. of Fig. 17-12; abbreviations of classes of transformation sections are explained in Fig. 7-11).

Concluding Remarks on the Transformation Analysis

According to the transformation analysis of 19 raw material units (Fig. 7-12 and Fig. 7-13), raw material units indicating blank production dominate the assemblage. Among these, surface shaping slightly exceeds raw material units that were classified as being related to the very initial preparation of raw nodules or the reduction of (simple) cores.

However, if surface shaping (Cc/surface: one case, and Cb/surface or Cm/surface: four cases) is seen as the main goal of flaking in level V/1, it becomes clear that transformation sections at Kabazi II in most cases do not cover initial or final phases of the operational chain. Within the excavated area, reduction processes usually started with decorticated raw pieces or big flakes, and ended with the modification of simple flakes. With exception of RMU1, which is a surface shaped blank that was flaked again after lateral breakage, there are no fragments of preforms or surface shaped tools, nor are there many chunks which would point to failed initial preparation or surface shaping, e.g. interrupted by fissures or cracks. Instead, flakes often tend to be large (struck from raw nodules: RMU 9, RMU 11; detached from preforms: RMU 3, RMU 4). Despite the fact that the low quantities of pieces allocated to individual raw material units calls for cautious interpretations, transformation analysis would still appear to lead to reliable results. Seeing as qualitative attributes are correlated with the logics of flaking, it is highly probable that reduction sequences were stopped after initial flaking of raw pieces, preforms or surface shaped blanks. If this is true, then the hypothesis that preforms or surface shaped tools were taken out of the excavated area after minor flaking is more probable than the assumption that failed preforms were discarded on site and remain as yet undiscovered due to the limited trench size or as a result of the site formation process. This is strengthened by the fact that with one exception (RMU 1), artefacts which indicate the modification, use or discard of surface shaped blanks are missing. There are no lateral sharpening flakes or broken tool tips from bifacial tools, nor are there any discarded surface shaped tools. Instead, most flakes of considerable size were used and ended up as formal tools or flakes with irregular retouch. The only rejuvenation flakes found belong to simple tools, one of them probably made on a flake from surface shaping (RMU 5). The lack of any item that could prove the modification of surface shaped blanks (and the subsequent use of surface shaped tools), and the fact that only one preform was found, can be interpreted in different ways:

1. The main focus of flaking activities was not the production of finished surface shaped tools, but the flaking of preforms and decorticated raw pieces, and the use or retouch of flakes from surface shaping according to immediate needs; therefore, the surface shaping often did not exceed the phase of a preform;

2. If originally present at all, surface shaped tools were used extensively;

3. Preforms and/or surface shaped tools were taken to other sites;

4. Preforms and/or worn out surface shaped tools as well as rejuvenation flakes and broken tips were discarded either out of the area covered by our trench, or were deposited in areas since destroyed by flooding.

In cases where no signs of surface shaping were found, raw material units were classified as deriving from core reduction (Cb, Nb: five cases). However, in most if not all of these cases the flaking was focused on the rough primary preparation of preforms for surface shaped tools rather than the flaking of simple cores. Again, with one exception, cores or preforms are missing.

Although assemblages of raw material units tend to be incomplete, they seem to be representative for flaking activities according to the logics of reduction sequences. Thus, an interpretation of units with long reduction sequences as a stock of raw material, carried around in different, yet initial phases of the production of surface shaped tools, would be most appropriate. If simple blanks were needed, surface shaping was continued, or was started, but only the flakes (and not the surface shaped tools themselves) were used. The flakes often show traces of usage, either as formal tools or as pieces with irregular retouch. It seems as if flakes for use were selected according to size only, and not on the basis of their specific outline, thickness or lateral section. In most cases, surface shaped preforms in varying initial states of production were taken out of the excavated area. This interpretation of the data would not only be in concordance to most hypothesis suggested above (1. to 3.), but would also explain best the general structure of the (micro-)assemblages, with nearly no performs, some flakes from initial preparation or surface shaping, no specific criteria for the selection of blanks for formal tools, and a high percentage of irregular retouch that again speaks for an ad-hoc selection of more intensively used blanks.

Single pieces produced on site were classified as resulting from the rejuvenation of surface shaped tools (Ei/surface: one case) or breakage of simple tools (Ei: one case). In both cases, the tools themselves were not discarded, but taken out of the excavated area. Obviously, surface shaped bifacial tools were only randomly needed at the site, and it was sufficient to use and rejuvenate already existing items. Six single pieces were discarded without flaking in the excavated area. These fall into two categories, blanks (Bw: five cases), and tools (Tw: one case). It is difficult to judge whether these single pieces reflect off-site blank production.

Blanks that were, according to transformation analysis, not manufactured at Kabazi II comprise a *couteaux à dos naturel* (RMU 15), two formal tools (RMU 13, RMU 17), a surface shaped tool (RMU 16), and one large flake (RMU 14). The impression that blanks which were produced and modified on-site were selected randomly, whereas imported single pieces listed above show a preference of large pieces and tools, might be seen as a strong argument for the assumption that these were taken from reduction sequences conducted at other sites. Otherwise, one would expect a less sophisticated selection of blanks. The latter is true for a chunk (RMU 19), a small fragment (RMU 20), and a flake from surface shaping, which might indicate on-site reduction sequences incomplete due to post-depositional processes which occurred during site formation.

Reconstruction of Moves

The results of transformation analysis enable us to state that at minimum eleven items were carried into the excavated area and there underwent some measure of reduction which was, by and large, dedicated to the production of surface shaped tools (Fig. 7-12 and Fig. 7-13). Despite the fact that artefacts might be missing due to flooding having affected the south-western part of the trench, the transformation of those raw material units recovered still speaks in favour of the same pattern: depending on the state of reduction, only some flakes were removed either by direct hard hammer percussion, or by direct soft hammer percussion. The near lack of bifacial rejuvenation flakes or tool tips clearly speaks against the assumption that numerous surface shaped tools were originally present in the excavated area. At the same time, the short-term character of all occupations in Unit V, including level V/1, makes it highly unlikely that there was an enlarged area of activities, with numerous spots of subsequent knapping and/or special toss zones. Instead, it seems likely that most raw material units saw minor flaking only, and that this ended with the production of surface shaped blanks or even preforms. In many cases, flakes from the initial preparation or from the first working steps of plan-convex surface shaping show modifications of lateral edges. In general, flakes were used regardless of their outline, the amount of dorsal cortex or their thickness; it seems as if size was the only criteria for the selection of intensively used blanks. The frequency of formal tools is low, but there are many pieces with irregular retouch. As for the mode of production, there is also a clear pattern visible for the export of artefacts out of the excavated area (Table 7-7). In nine cases, the inner part of the worked piece was missing. According to transformation analysis, they did not reach a final state of surface shaping and, therefore, were not ready for modification or use. Thus, it does not seem probable that the pattern of discard can be explained exclusively by natural site formation processes. Instead, it seems as if a good portion of preforms and/or surface shaped blanks was transported out of the excavated area, and even out of the site. For single pieces, no secure interpretation can be offered. While the import of formal tools, sometimes rejuvenated on the site and exported afterwards, makes sense, little can be said about isolated blanks discarded in the excavated area.

To summarise, Neanderthals came to Kabazi II, level V/1 at a time when the site was situated near the river bank. The climate at the beginning of the last Glacial still favoured forest steppe type vegetation, with trees in the immediate vicinity of the limestone block. It is not entirely clear if the assemblage is the result of a single visit, or a palimpsest of several visits. Nevertheless, transformation analysis shows a recurrent pattern of import, on-site flaking, and probably also export. In general, the Neanderthals were content with using raw material from primary sources as well as from outcrops where residual material could be collected from the surface. They were equipped with some tools, a number of which were surface shaped, several surface shaped blanks and previously flaked preforms (from past campsites), and a few raw nodules (possibly taken from outcrops they passed by). Only when necessary, were reduction sequences continued which had begun elsewhere. These, however, were stopped when demand was satisfied by local supply. The Neanderthal mode of planning (Fig. 7-14) was geared towards preparation for unforeseen periods rather than

	import	**on-site discard**	**export**
simple blank	5	37	
simple tool	2	8	1
surface shaped tool	1		
(initially) surface shaped blank	2	1	3
preform or core	6	1	6
raw piece or chunk	3	7	
sum	19	54	10

Table 7-7 Kabazi II, Unit V/1: Summary of pieces that, according to transformation analysis, were imported into, discarded in, and exported from the excavated area.

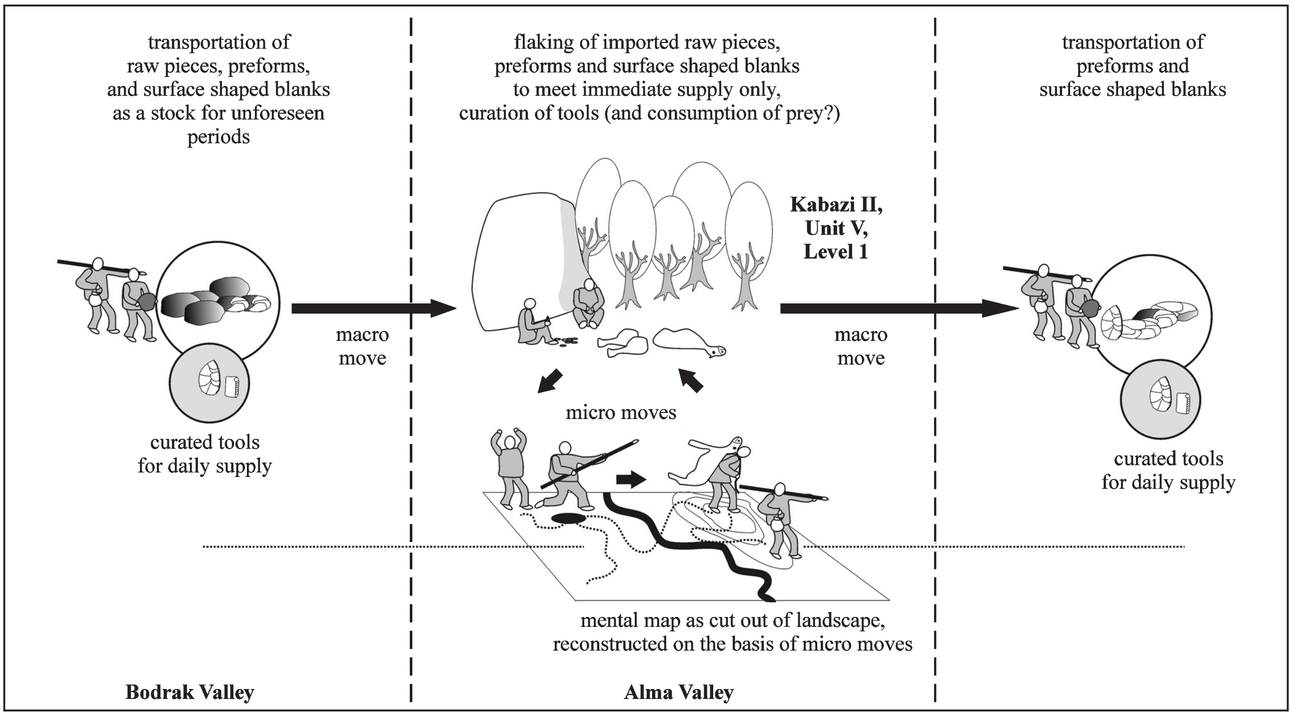

Fig. 7-14 Kabazi II, level V/1: Hypothetical reconstruction of moves. It is assumed that incomplete *chaînes opératoires* on the level of raw material units are the result of moves: some artefacts might have been left at previous camps or transported to future camps (macro moves), while others might have been taken to contemporaneous sites (micro moves).

focusing on preparation for anticipated activities. Most tools were produced *ad hoc* from blanks struck from a stock of raw material that mainly consisted of already flaked items. Although the technique of lateral sharpening flakes was generally known, there is little evidence for the curation of tools. Furthermore, one has the impression that the Neanderthals tried to restrict the consumption of lithics at Kabazi II to a minimum, possibly because raw material sources in areas of future macro moves were still unknown. It seems as if mental maps represented cut outs of the landscape only. Triggered by immediate needs, the knowledge of resources was possibly more the result of moves within the logistical territory around the site, rather than resulting from storing of places in the memory of the group, and long-term planning.

Abstract

КАРМАННЫЙ ЗАПАС НА ВСЯКИЙ НЕПРЕДВИДЕННЫЙ СЛУЧАЙ: ТРАНСФОРМАЦИОННЫЙ АНАЛИЗ КРЕМНЕВОГО СЫРЬЯ НА ПОСЕЛЕНИИ КАБАЗИ II, ГОРИЗОНТ V/1

Т. УТМАЙЕР

Специфика аккумуляции артефактов данного горизонта состоит в том, что во время их отложения площадь поселения подвергалась временным сезонным подтоплениям. Исходя из отсутствия в отложениях крупного обломочного материала, можно предположить слабую энергию аллювиальных процессов, которые не привели к серьезным вертикальным и горизонтальным перемещениям артефактов.

Технико-типологический анализ артефактов указывает на их принадлежность к микокским индустриям. 54 артефакта, обнаруженные в данном горизонте, подразделяются на 20 сырьевых групп. Только одна сырьевая группа состоит из “экзотического” кремня, тогда как все остальные сырьевые группы представлены обычным бодракским кремнем. В соответствии с проведенным трансформационным анализом, реконструированы следующие действия, приведшие к образованию данного комплекса артефактов:

1. на стоянке оставлена часть импортированного орудийного набора и сколов;
2. на стоянке были переоформлены некоторые из принесенных орудий;
3. на стоянке имело место ограниченное расщепление импортированных желваков, преформ, нуклеусов и обработка двусторонних орудий и их полуфабрикатов.

Не исключено, что большинство сырьевых групп связано с оформлением двусторонних орудий. В то же время, операционные ряды очень коротки – после снятия нескольких отщепов преформа или полуфабрикат двустороннего орудия транспортировались на другую стоянку. Зачастую отщепы, полученные на поселении горизонта V/1, несколько модифицировались маргинальной ретушью.

Таким образом, большая часть отщепов и орудий происходит из “карманного запаса”, которые транспортировались от стоянки к стоянке. Причем, снятие сколов с артефактов “карманного запаса” было крайне лимитированным. Похоже, что основной чертой отношения обитателей поселения горизонта V/1 к “карманному запасу” преформ и полуфабрикатов было его сохранение на случай непредвиденных обстоятельств, нежели получение морфологически завершенных двусторонних орудий.