IX

THE ARTIFACT ASSEMBLAGES

by

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The artifact assemblages recovered from AL1 , AL2, AL3, and AL4 are marked by the variety of raw materials. In addition to the imported flints and radiolarites described in the preceding sections, the Grubgraben tool makers made use of local quartz, quartzite and granulite to prepare series of expedient tools and occasionally worked on rock crystal. Quartzite and sandstone pebbles from the Kamp River gravels served as percussors. The majority of ornaments were made of cut dentalia elements; however, beads and pendants were also made from both local and exotic stones.

A- THE QUARTZ ASSEMBLAGES

Quartz artifacts are present at all levels; they represent 9% of the chipped stone artifact total in AL4, 11 % in AL3 and AL2, and only 3% in AL1. Assemblages include retouched and unretouched flakes, shatter, cortical flakes and cores (Table IX-1).

Flakes are rectangular, lamellar or expanding in shape and characterized by flat, generally oblique, platforms. Most of the larger flakes exhibit traces of use along one or sometimes two edges. In a few cases, as a result of either use or intentional preparation, the line of retouch covers all or almost all of one of the lateral margins forming a straight to slightly convex, jagged cutting edge. On the other specimens, macroscopic traces of use in the form of series of irregular scars extend over part of the cutting edges. Either a natural back or a thick edge placed directly opposite or at an angle to the cutting edge probably served as a handle. These artifacts which can be classified as denticulates are the only flake tools in the assemblages (Fig. IX-1).

Cortical flakes are in relatively small proportion, 5 for 2 cores in AL3, 7 for 5 cores in AL4. None were found in AL1 and AL2. Therefore it appears that the first stage of block preparation must have taken place somewhere else, either at the point of extraction or at another area of the site. The large size of the specimens of cortical flakes which have average weights of 69 gm in AL3 and 92 gm in AL4 confirm that quartz debitage started from rather large blocks.

Cores tended to be polyhedral or prismatic as the result of removal of lamellar flakes from one or more platforms. Flaking proceeded from a flat surface which was often a natural plane in the case of large chunks of materials or was obtained by the removal of a cap flake in the case of large cobbles. Then, the production of blades and lamellar flakes continued in alternation with some platform preparation. Irregularities and inclusions in the raw materials interrupted the process. Two of the larger cores have battered edges showing that they were reutilized as hammerstones.

The majority of quartz artifacts are small pieces of shatter weighing between 5 and 35 grams, irregular in shape, often with a quadrangular cross-section and no trace of a bulb of percussion. The abundance of quartz shatter may be due to several factors.

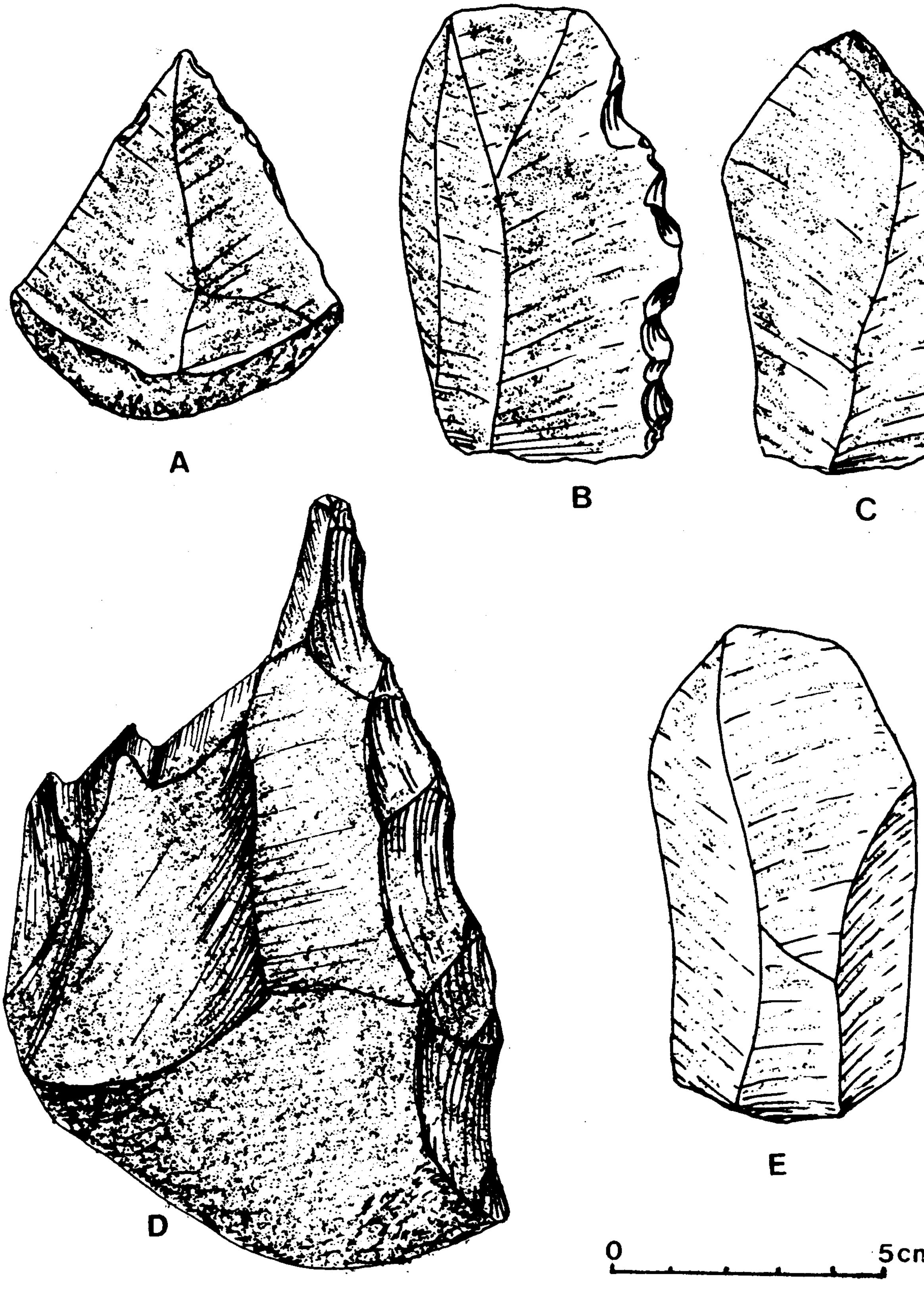

Fig. IX-1 Quartz (A-B), granulite (C, E) and quartzite artifacts (D).

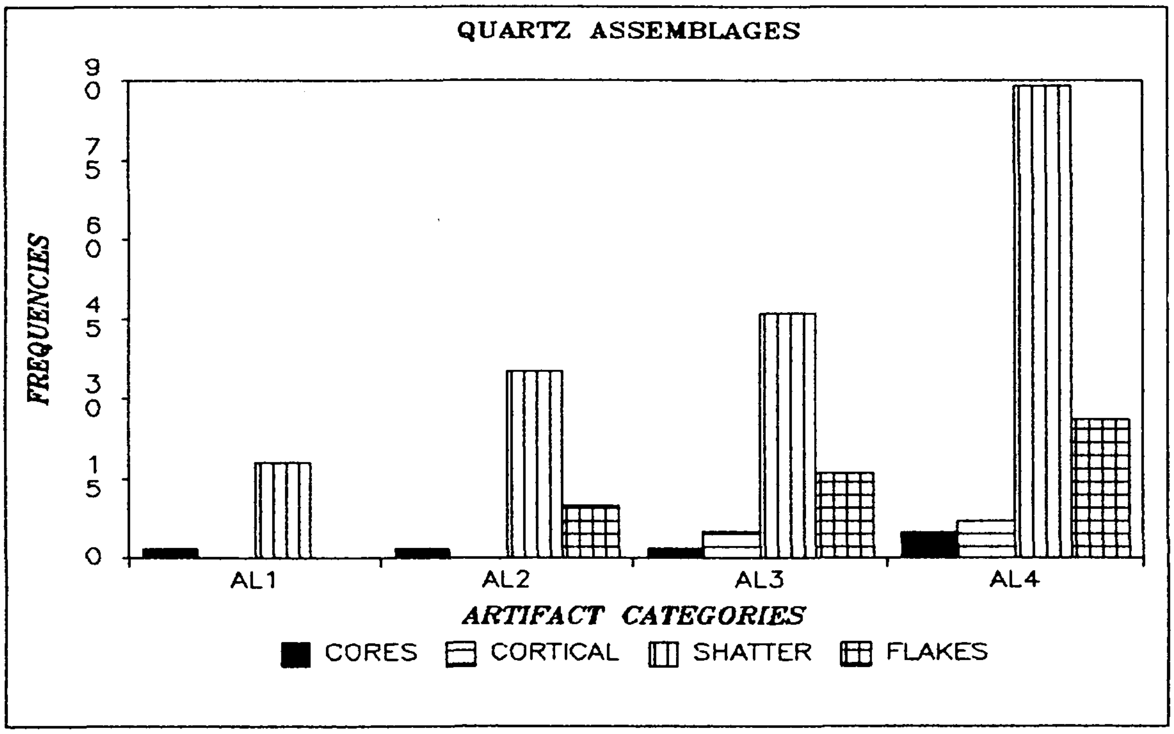

Fig. IX-2 Distribution of quartz pieces by artifact categories and by levels.

Pebbles picked from the Kamp River gravels may have been frost cracked. Alternatively, quartz chunks may have shattered when exposed to heat or when used as percussion tools.

TABLE IX-1 QUARTZ ASSEMBLAGE

	ARTIFACT FREQUENCIES				WEIGHT (IN GRAMS)			
	cores	cortical pieces	shatter	flakes	cores	cortical pieces	shatter	flakes
AL1	2	-	18	-	518	-	434	-
AL2	2	-	35	10		-	390	288
AL3	2	5	46	16	322	345	1,047	747
AL4	5	7	89	26	1,578	649	1,649	783

The relative proportion of the different categories of quartz artifacts remained relatively constant between levels considering the differences in the total number of artifacts present in each assemblage (Fig. IX-2, Table IX-1). Quartz flakes and shatter were associated with bone splinters and other faunal debris. The association is most clearly seen in AL2 where all quartz pieces were recovered in the area of the hearth along with scattered food debris. In AL4 as well, quartz pieces were more abundant in areas of hearth cleaning debris. The direct spatial association suggests that quartz artifacts were associated with butchering and cooking activities. The scarcity of quartz pieces in the AL1 workshop adds negative evidence to the proposed interpretation. In the context of butchering and cooking activities, quartz pieces may have had multiple functions, flakes being used to deflesh carcasses or cut meat, chunks or pebbles to smash long bones and mandibles for marrow. Pebbles may have also been used as pot boilers which would account for the presence of so much small shatter. The assemblage, as a whole, represents a set of expedient tools made on the spot, around the hearths, from blocks of raw materials obtained locally.

B- QUARTZITE AND GRANULITE ASSEMBLAGES

Granulite was seldom used as raw material by Paleolithic groups. It was introduced at Grubgraben in the form of cobbles with a weathered outer surface. The rock has a platy structure and tends to break into platelets when hit by a percussion tool. Knappers attempted to control the fracturing process in order to obtain wedges with a ring of cortex around three sides and a straight cutting edge or naturally backed pieces (Fig. IX-1). Blades are rare. Two specimens from AL4 have traces of use along the lateral edges. In addition to the artifact listed in Table IX-2, a number of split pebbles and choppers were recovered from the AL2 pavements. Granulite knapping produced a few expedient tools whose spatial distribution is comparable to that of the quartz specimens.

TABLE IX-2 GRANULITE ASSEMBLAGE

	CORES	WEDGES	CORTICAL FLAKES	NATURAL BACKED FL.	BLADES	SHATTER
AL2	1	1	4	0	3	4
AL3	1	0	6	3	6	4
AL4	4	4	6	8	4	7

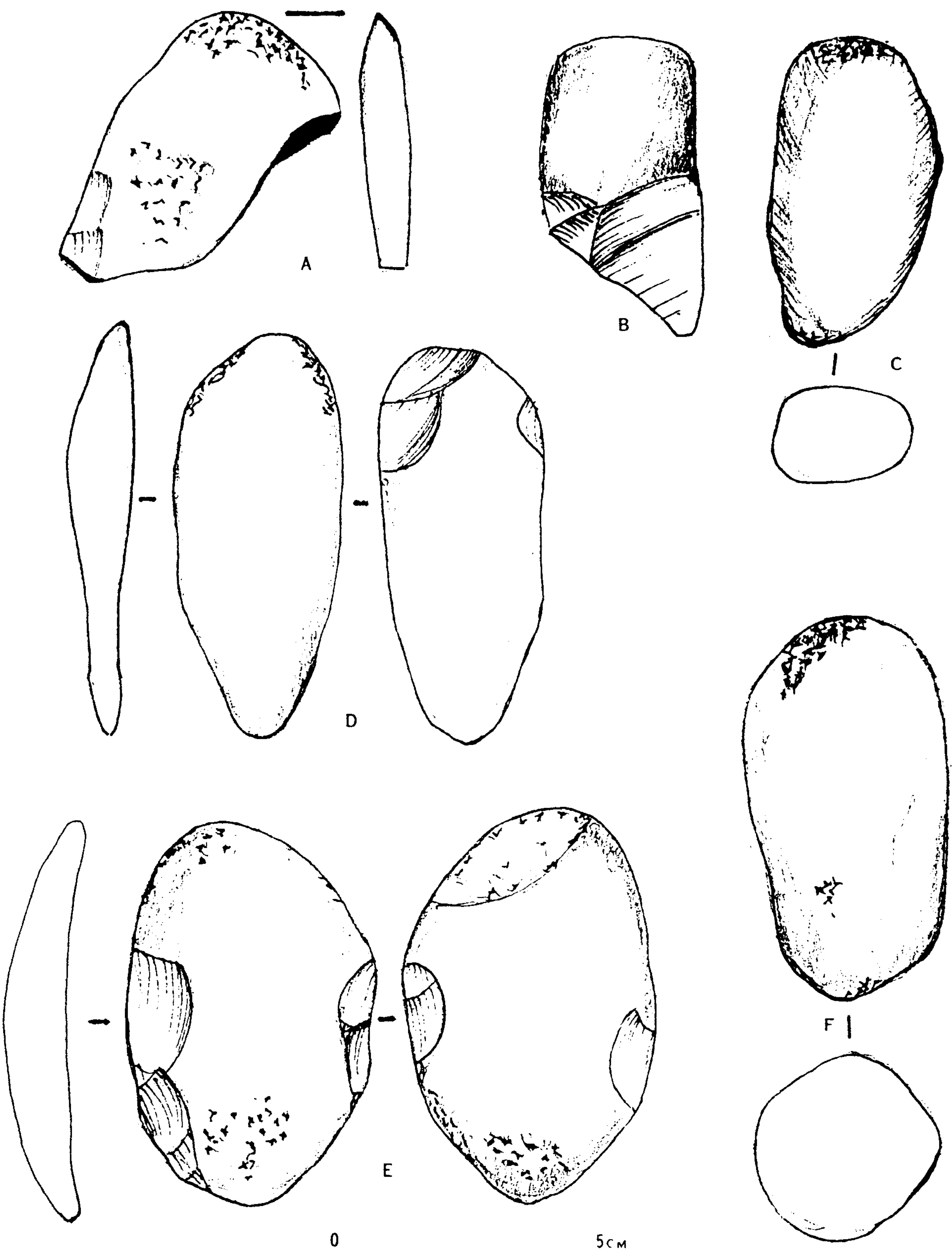

Fig. IX-3 Percussion tools.

Quartzite pieces include several choppers and picks (Fig. IX-1) which may also have been part of a butchering tool kit.

C- PERCUSSION TOOLS

Series of small quartzite, schist and sandstone pebbles with percussion marks were recovered in each level. These artifacts fall into two categories. The first includes a series of long and narrow pieces with rounded cross-sections and diameters ranging between 15 mm and 35 mm (Fig. IX-3 C, F). On these specimens traces of use are concentrated at both extremities implying use as percussion tools or pestles. Some of the specimens were broken by lateral impact (Fig. IX-3 B).

The second and more common group includes wide and thin pieces with flat or slightly curved surfaces (Fig. IX-3 A, D, E). On these specimens, pecking marks occur both at the extremities and on the distal portion of the flat surfaces. Lateral edges are often chipped and many specimens are broken. Specimens of both types occur at all levels.

D- THE FLINT AND RADIOLARITE ASSEMBLAGES

Flint and radiolarite artifacts form the bulk of the lithic industries. Samples of sediment matrix taken from AL3 and AL4 contained minute splinters of less than 3 mm indicative of the fact that some flint knapping was taking place in site. However, the flint knapping done at the AL1 workshop or around the AL2 hearth may not represent the complete reduction sequence of flint and radiolarite blocks.

1-The reduction sequence

Elements attributed to stages of the reduction sequences are as follows:

a.Cores

Cores fell into categories of "large" with weight greater than 100 gm, "small" with weight of 40 to 90 gm and "miniature" with weight of less than 30 gm. The larger specimens occurred in AL2. Among these was an unexploited specimen of coarse grained, green radiolarite which had been prepared on one side to produce a quadrangular cross-section. Two pieces of tabular raw material indicate attempts at alternate removals of blades on either side of a platform edge, across the thickness of the tabular chunk (Fig. IX-4 K). Other large cores are polyhedral and irregular (Fig. IX-5).

Small cores are flat with one or two opposed platforms (Fig. IX- 4 E, I, J, L). Removal scars indicate that the last stages of blank removal produced small flakes and bladelets of less than 30mm in their maximum dimension. Miniature cores (Fig. IX-4 H) are conical, the last stage of blank removal having produced micro-blades .

b.Trimming flakes and core renewal flakes

Large cortical flakes 70 to 100 mm in length representing the partial trimming of a block of white flint were recovered from AL1. Their number was insufficient to permit the reconstruction of the initial block. A number of cortical blades (Fig. IX-4 B, C) show that , in the case of cobbles, blade removal started with little if any trimming beyond the preparation of a platform at one of the narrow ends of the core. The length of cortical blades varies between 60 and 85 mm. Semi-crested blades (Fig. IX-4 A, D) and platform flakes are the result of rejuvenating the core by changing the platform angle while maintaining the same direction of blank removal. In other cases, flakes

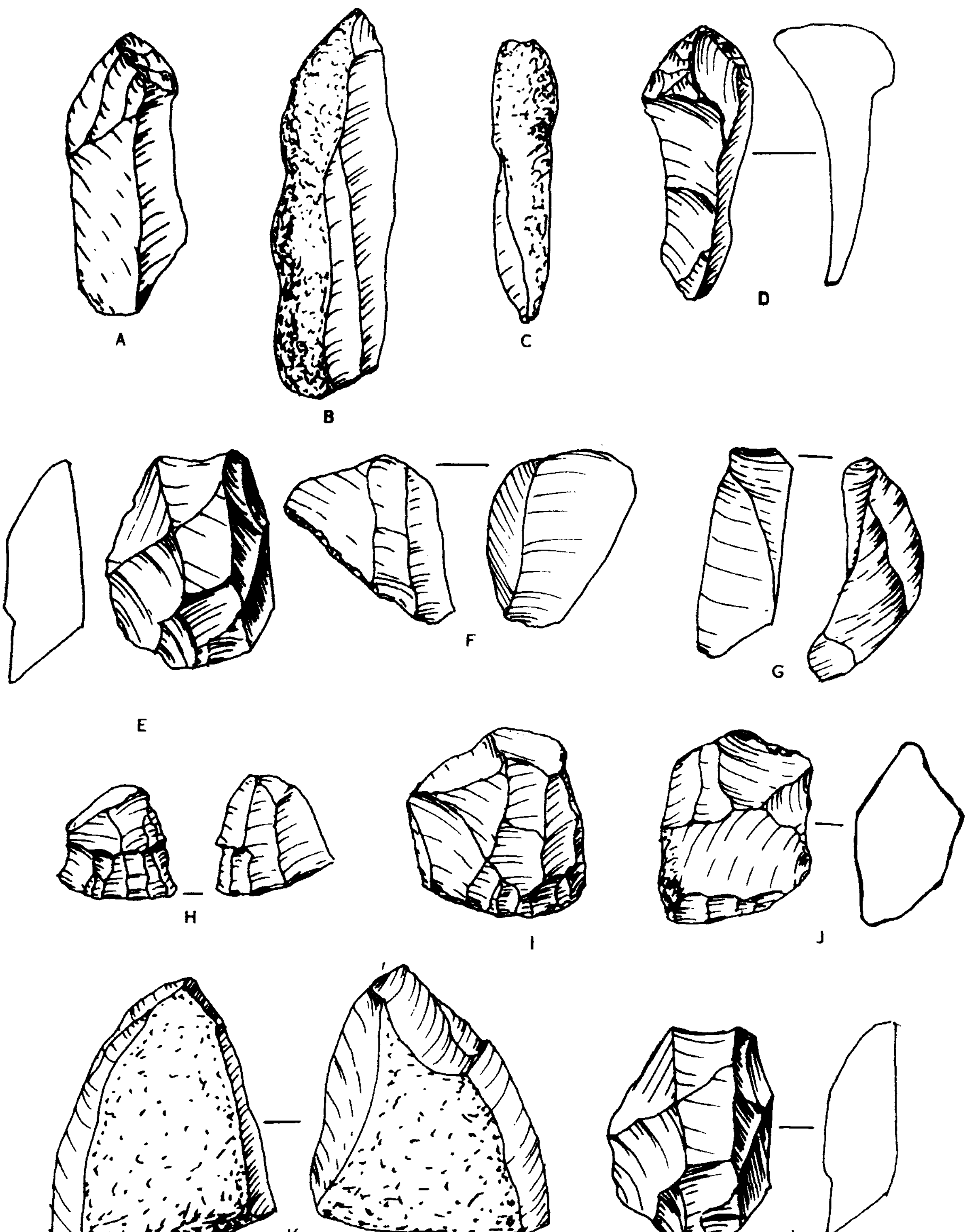

Fig. IX-4 Cores, cortical blades and core preparation products.

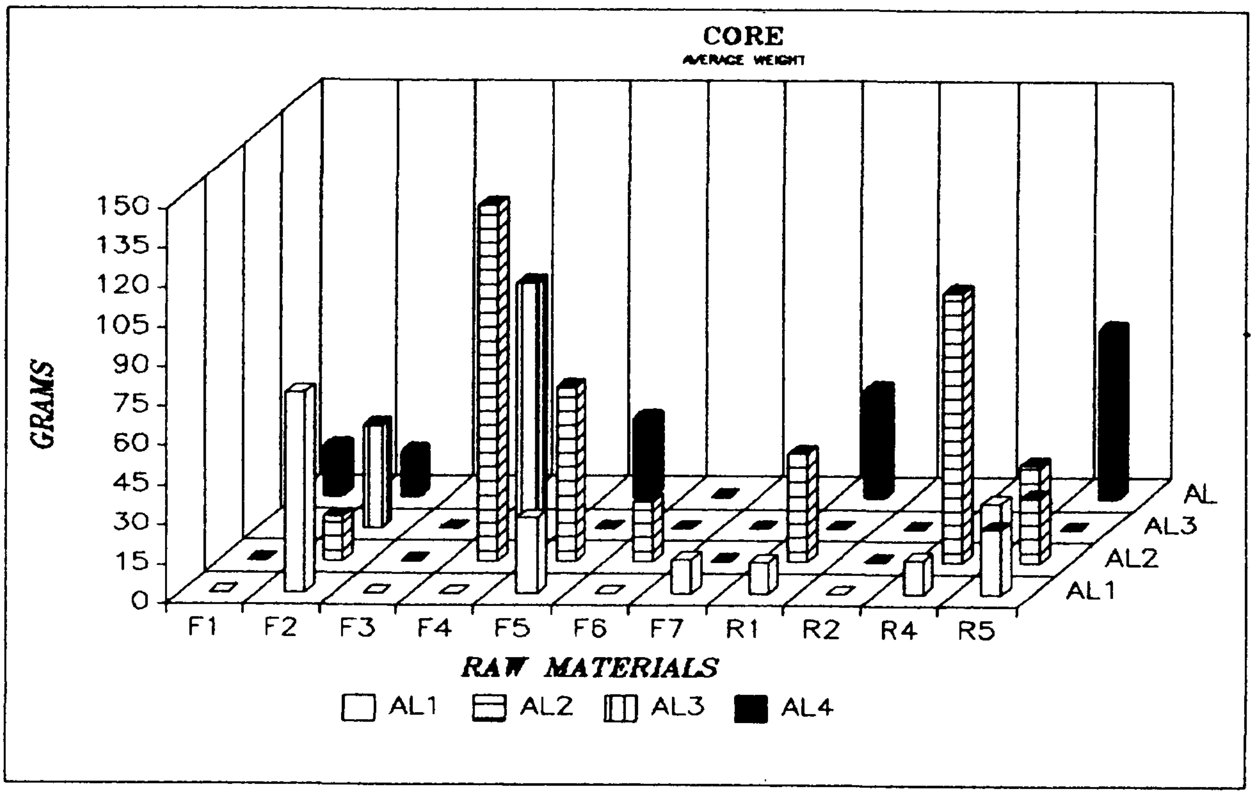

Fig. IX-5 Average weight of cores by categories of raw materials and by levels.

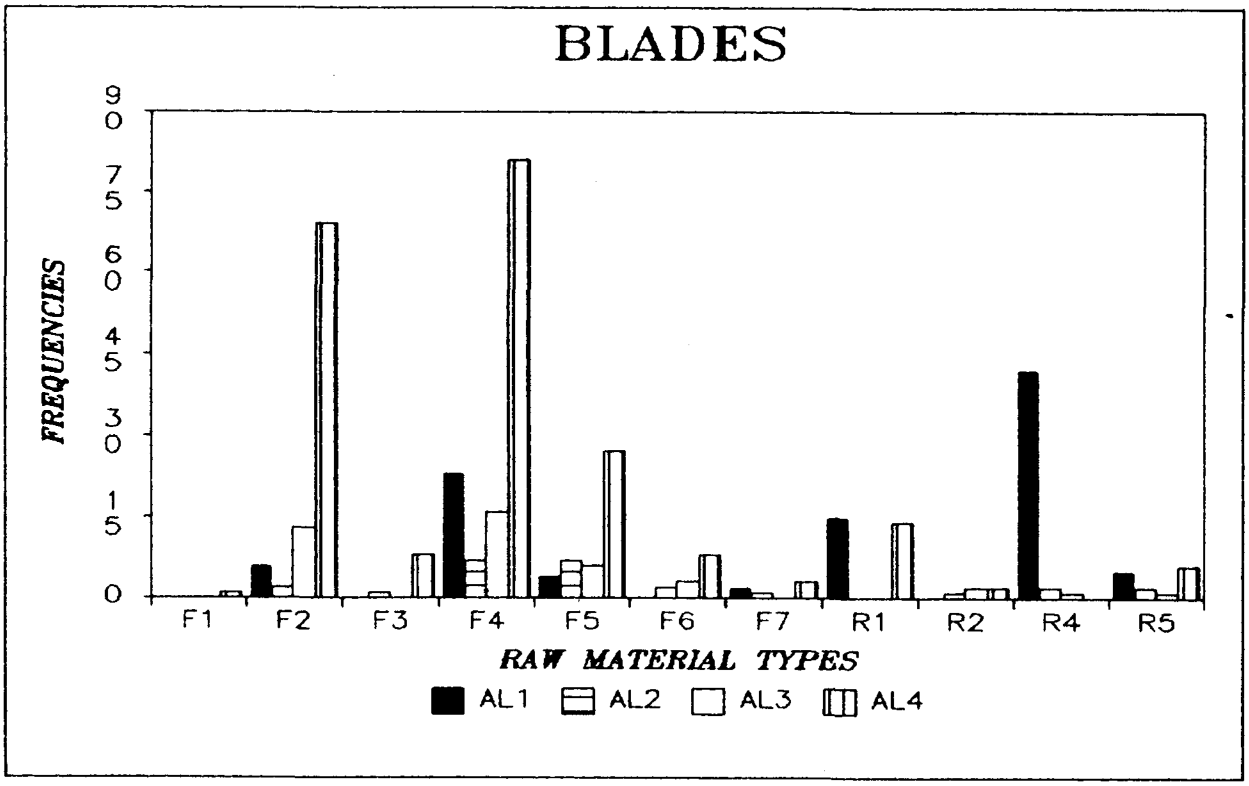

Fig. IX-6 Blade frequencies by raw material categories and by levels.

c. Flakes and Blades

The weight distribution curves of flint and radiolarite flakes show that small pieces of 1 gm or less predominate and that about 90% of the specimens fall below 10 gm in AL2, AL3 and AL4 and 80 % in AL1. (Fig. IX-6). The small size of the flake assemblage strongly suggests that flakes were the result of the secondary preparation of core platforms and the manufacture and recycling of tools.

Varieties of flint were preferred to radiolarites for the manufacture of larger blades in all levels except in AL1 (Fig. IX-6). Everywhere, most of the blades were fragmented.

With the exception of a few large, overshot blades of larger dimensions, complete blades are short and narrow as well as irregularly shaped. The small size of blades and blade fragments is reflected in the average blade weight of 4.2 gm (Table IX-5).

The larger, regularly shaped blades were used as blanks for the manufacture of scrapers, burins and other tools. Few, if any, were discarded.

In summary, the knapping process started with minimal trimming, probably in an effort to conserve materials. Once the initial platform had become unusable after a few blades had been drawn, two alternate strategies could be applied. The first involved the removal of a platform flake, some lateral preparation and the removal of a semi-crested blade. The other consisted in preparing a second platform at the other end of the core by removing the distal end of the original core. The reduction process continued until the cores were reduced to a minimum size that did not permit the production of blades of more than 30 mm. Intense reduction was equally applied to all varieties of raw materials at least in the AL3 and AL4 assemblages where the average core weight was 39 gm and 25 gm respectively. In both AL1 and AL2 a few larger cores, weighing between 60 gm and 100 gm were recovered along with some very small specimens of less than 20 gm (Table IX-3).

Large, thick flakes and tabular pieces were in turn exploited as cores to produce spall-like small blades and bladelets as mentioned in the preceding section (Fig. VIII-4 and 5). The process of tabular flake reduction completed the repertory of knapping techniques recognizable within the site assemblages.

2- The tool assemblage

Tools represent about 25% of the debitage while flakes account for 55% and blades about 20 % (Fig. IX -7). It is of some interest to note that the overall proportion remains the same between levels whereas the relative contribution of the different kinds of raw materials changes significantly as discussed earlier. The overall figures fall well within the range of assemblages from Central European Gravettian sites where flint knappers faced raw material constraints similar to those existing at Grubgraben. That is to say sites where raw materials were introduced in the form of blocks requiring little preparation and where extreme core reduction indicated a need to economize raw materials. The sites of Lubna I, II, III and IV (Czechoslovakia) where flakes accounted for 50 to 55% and blades for 10 to 20% constitute a good example of a similar situation (Kozlowski, 1986).

With the exception of AL4 where a total of 155 flint and radiolarite tools were recovered, the tool assemblages are small, 23 in AL2, 42 in AL3 and 63 in AL1. However, significant differences appear in the composition of these assemblages. The AL1 assemblage is dominated by burins and marginally retouched blades with scrapers and armatures present in lesser percentages. Scrapers constitute the dominant group in the other levels (Fig. IX-8 and Table IX-6). A greater number of scrapers was associated with the activity area around the hearth and the paved structure in AL2 and

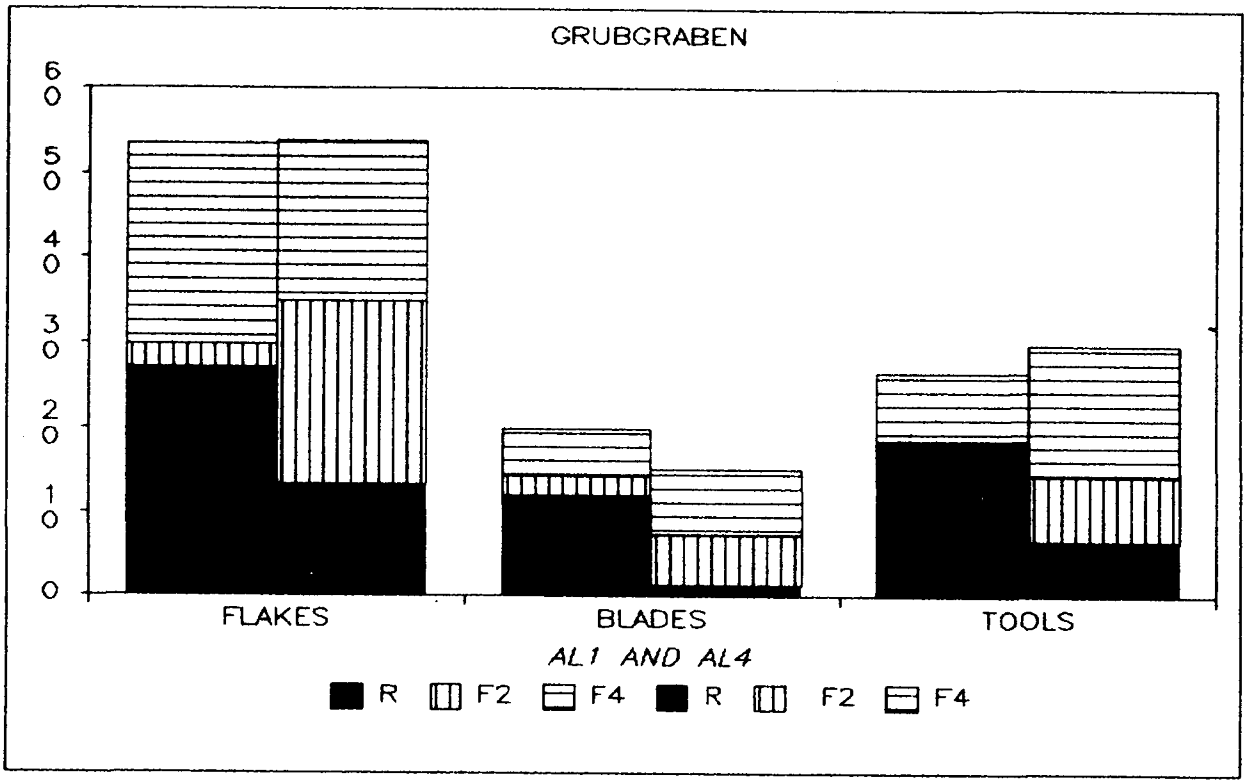

Fig. IX-7 Relative frequencies of flakes, blades and tools by raw materials for AL1 and AL4.

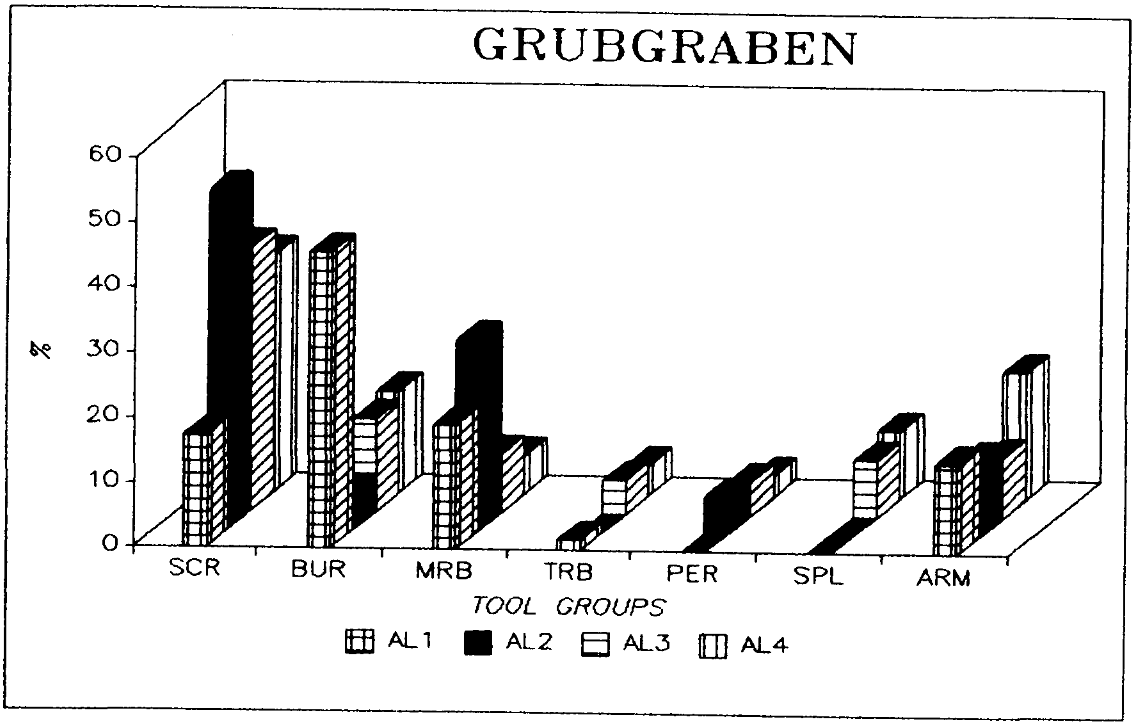

Fig. IX-8 Relative frequencies of tool groups by levels. SCR, scrapers; BUR, burins; MRB, marginally retouched blades; TRB, Truncated pieces; PER, piercers; SPL, splintered pieces; ARM armatures.

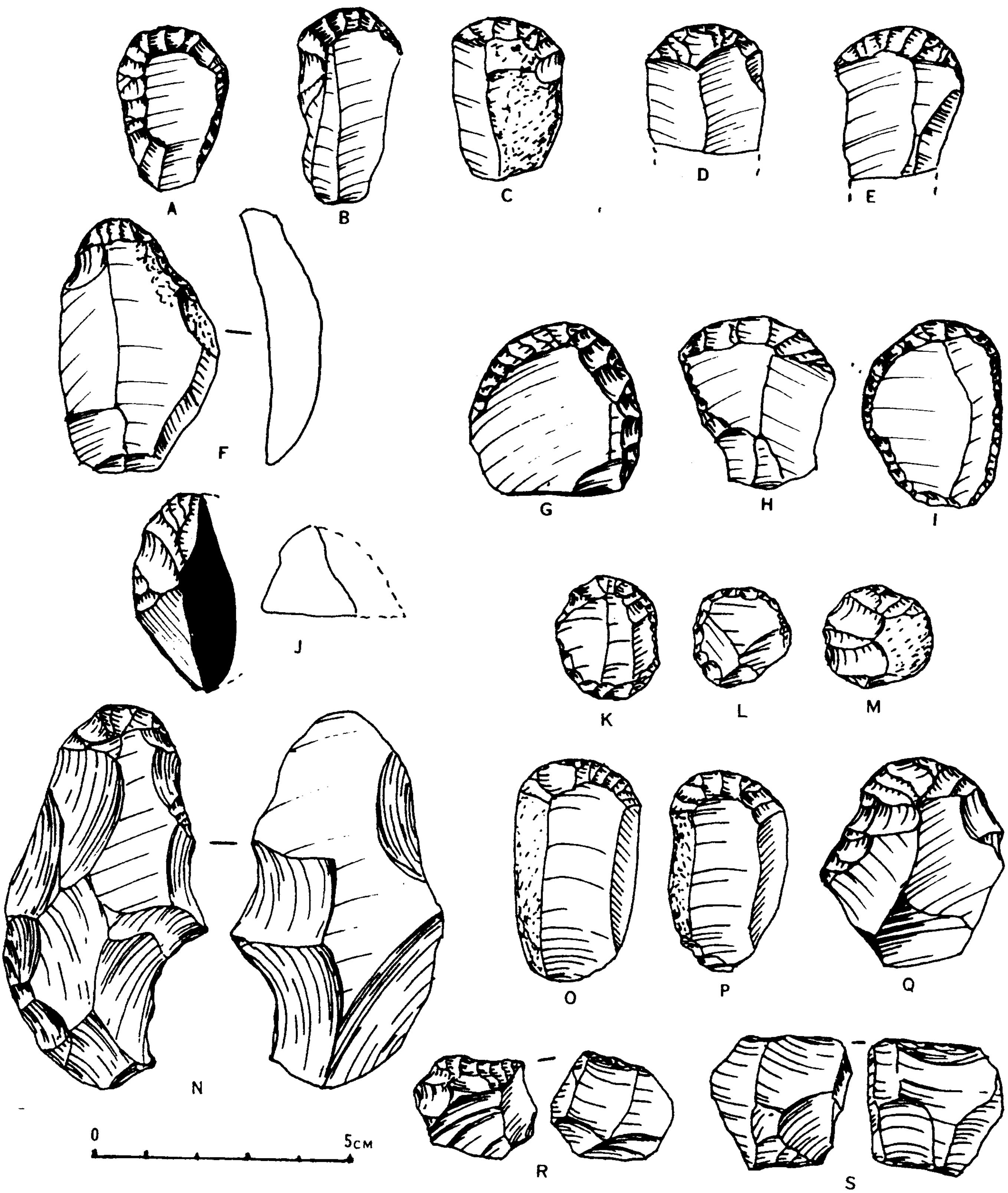

Fig. IX-9 Different varieties of end-scrapers and splintered pieces with areas of hearth cleaning debris in AL4. Burins were localized in specialized activity areas clearly identified in AL1. A comparable situation existed at Kadar where burins were found in greater number in an area located to the side of a hearth and a flint knapping workshop whereas scrapers were concentrated within the structure identified as a dwelling (Montet-White *et al.*, 1986).

The assemblages are marked by typological diversity. The 22 specimens from AL2 represent 16 different tool categories of the Sonneville-Bordes and Perrot (1954-57) type-list, the 42 tools from AL3, 22 categories and the 155 tools from AL4 fall into 29 categories. The tool kit of the AL1 workshop contained 16 different tool forms. Different factors contribute to the high degree of morphological variability of the flint and radiolarite tools: choice of blanks, intensity or invasiveness of retouch and, more important perhaps, sharpening and recycling processes. The relative importance of these different factors on each tool group is examined in the following pages. The discussion is based on the assumption that metrical variations reflect the degree of tool specialization. Therefore, measurement distributions which may show continuity or clustering are as important a component of tool definition as morphological and technological characteristics. Metrical variations are especially useful in assessing patterns of tool reduction which probably related to intensity of utilization. This is the approach taken in a number of recent studies of Mousterian variability (especially Dibble, 1988; Jellinek 1984; Rolland, 1981). The same approach has been applied independently to the study of Upper Paleolithic assemblages (Montet-White, 1982, 1988).

Scrapers

Because they produced the widest and longest blanks, flint varieties were the preferred materials for scraper manufacture in AL2 (76%), AL3 (86%), and AL4 (95%) (Fig. IX-10, Table IX-7). More specifically, flakes of patined flint F2 and blades and tabular flakes of white (F4) and grey (F5, F6) flints were selected to make end-scrapers in AL4.

Blades selected for scraper manufacture are 18 mm to 25 mm wide, which implies careful selection within assemblages where blanks of this size were in small number. It is difficult to estimate the degree of length reduction that resulted from the scraper edge retouch as so few specimens of 15 mm to 25 mm wide, unretouched blades remained within the assemblages. In any case, the Grubgraben end-scrapers on blades are short, with length varying between 35mm and 50 mm (Fig. IX-9 B, C, O, P). Scrapers on flakes are short and often as wide as they are long (Fig. IX-9 G). The scattergram of scrapers length and width shows that the distribution of scrapers on blades and that of scraper on flakes largely overlaps (Fig. IX 11). Originally, flake and blade scrapers tend to be more distinct. But, the progressive reduction due to sharpening and breakage reduces shape differences and produces an homogeneous group. Sharpening methods vary according to blank types. When resharpening by marginal retouch becomes difficult, the tip of blade scrapers is snapped off, reducing the tool length (Fig. IX-9 D,E) whereas both the end and the lateral edges of flake scrapers are broken off as described above (Fig. VIII-4) reducing the width as well as the length of the tool. In both groups, scraper edges are convex (70%) to round (20%) or flat (10%). Scraping edge retouch is parallel and lamellar on almost all specimens and sometimes extends to the lateral margins (scrapers on marginally retouched blades Fig. IX-9 A, B; scrapers on retouched flakes, H; circular scrapers, I). It seems, then, that scrapers on blades and scrapers on flakes constitute a single tool type. And, the scarcity of wide blades was compensated by using lamellar flakes and some tabular flakes.

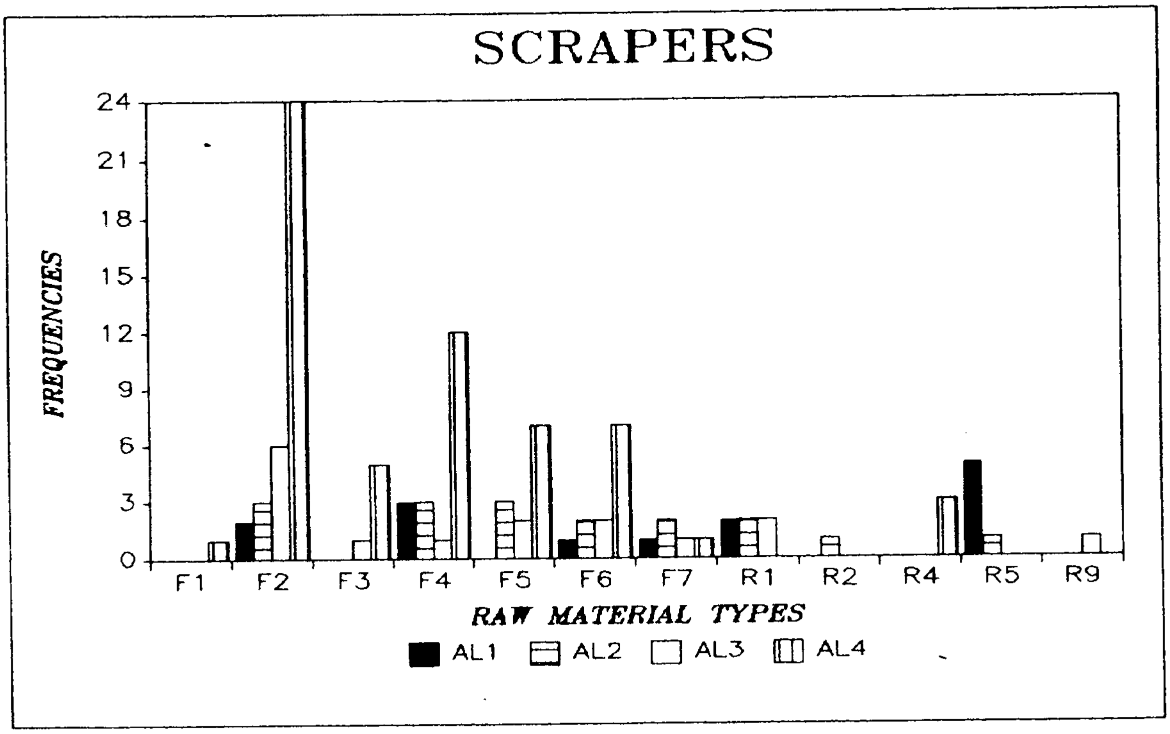

Fig. IX-10 Distribution of scrapers by raw materials and by levels.

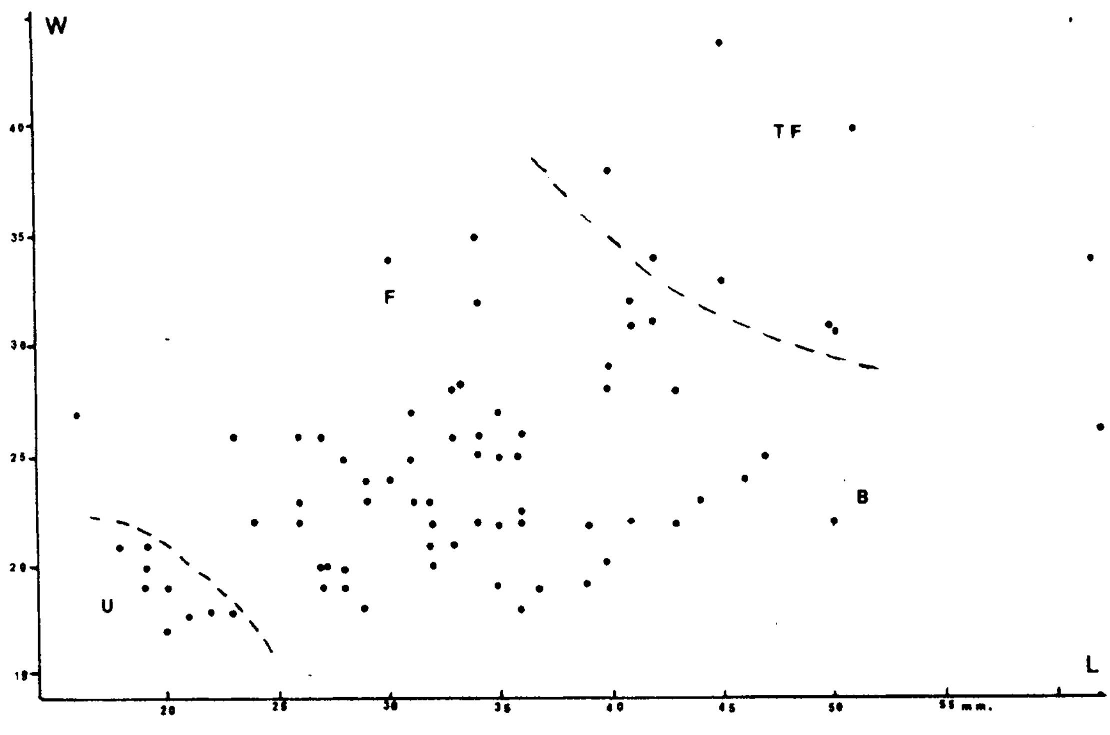

Fig. IX-11 Scattergram of scraper measurements; length on the X axis and width on the axis. U, ungiforms; B, blades; F, flakes; TF, tabular flakes.

The small group of unguiforms from AL3 and AL4 are made on blades (Fig. IX - 9 K), flakes (Fig. IX-9 L), and even cortical flakes (Fig. IX-9 M). It is difficult to know whether these artifacts are a definite tool type or whether they represent the ultimate stage of scraper reduction. However, on the width-length scattergram (Fig. IX-11), unguiforms do constitute a well defined cluster which is separated from the smaller scrapers on flake or broken blade. This argues in favor of their being a distinct tool type or, more probably, a distinct tool element perhaps associated with different types of handles.

The scrapers on tabular pieces are characterized by more or less pronounced, shouldered working edge (Fig. IX-9 F, N). Some specimens are associated with deep scalar retouch of the inner face. These specimens, which are outliers on the scattergram, may well have constituted a separate tool type. A few specimens of carinated scrapers are similar in shape and size to the small group of scrapers on thick cap flakes noted above (Fig. VIII-2 A,B). In all these specimens, the most important trait seems to be the maximum thickness of the blank and the steep, rounded shape of the scraping edge. Several of the carinates have been broken in two by hitting the crest of the dorsal face (Fig.IX-9 J). Carinates constitute a group distinct from shouldered scrapers and from the blade and flake scrapers.

The model of scraper variability at Grubgraben can be summarized as follows:

cortical flakes → carinates
tabular flakes → shouldered scrapers
flakes, blades → end-scrapers(+ marginal retouch)
blade/flake fragments → unguiforms

The Grubgraben scrapers differ from scraper series from the Gravettian levels of Willendorf II and from the Epigravettian series of Kadar. In the latter assemblages, scrapers formed a homogeneous group characterized by a narrow range of measurement variations which reflected a high degree of blank selection (Montet-White 1984, 1988). However, the Sagvar scrapers exhibit a wider range of metrical variations and include a greater variety of blanks. It appears that at Sagvar and at Grubgraben raw material constraints had considerable effect on the shape and size of lithic tools. However, in all these assemblages the common scraper form is of short to medium length, lamellar in shape, with a convex to rounded scraping edge. Lateral retouch appears as a secondary characteristic at Grubgraben where marginally retouched blades are few whereas, at Kadar especially and to a lesser degree at Sagvar, both marginally retouched blades and end-scrapers with lateral retouch are well represented.

Carinate and shouldered scrapers are represented in small numbers at Sagvar as well as at other Epigravettian sites in Hungary. Unguiforms do not appear in the Sagvar inventory. These small scrapers appear as a technological innovation in the Grubgraben assemblage.

Burins

At all levels are found a small percentage of burins made of white flint; however, a large proportion of AL4 burins are made of patined flint (F2) and AL1 burins of green radiolarite (R4) (Fig. IX-12")

In terms of size, burins fall into two groups, a larger group including specimens weighing between 18 and 53 gm and a smaller group comprised of specimens ranging between 5 and 15 gm. In addition, there is a group of burin tips which weigh between 2 and 4 gm.

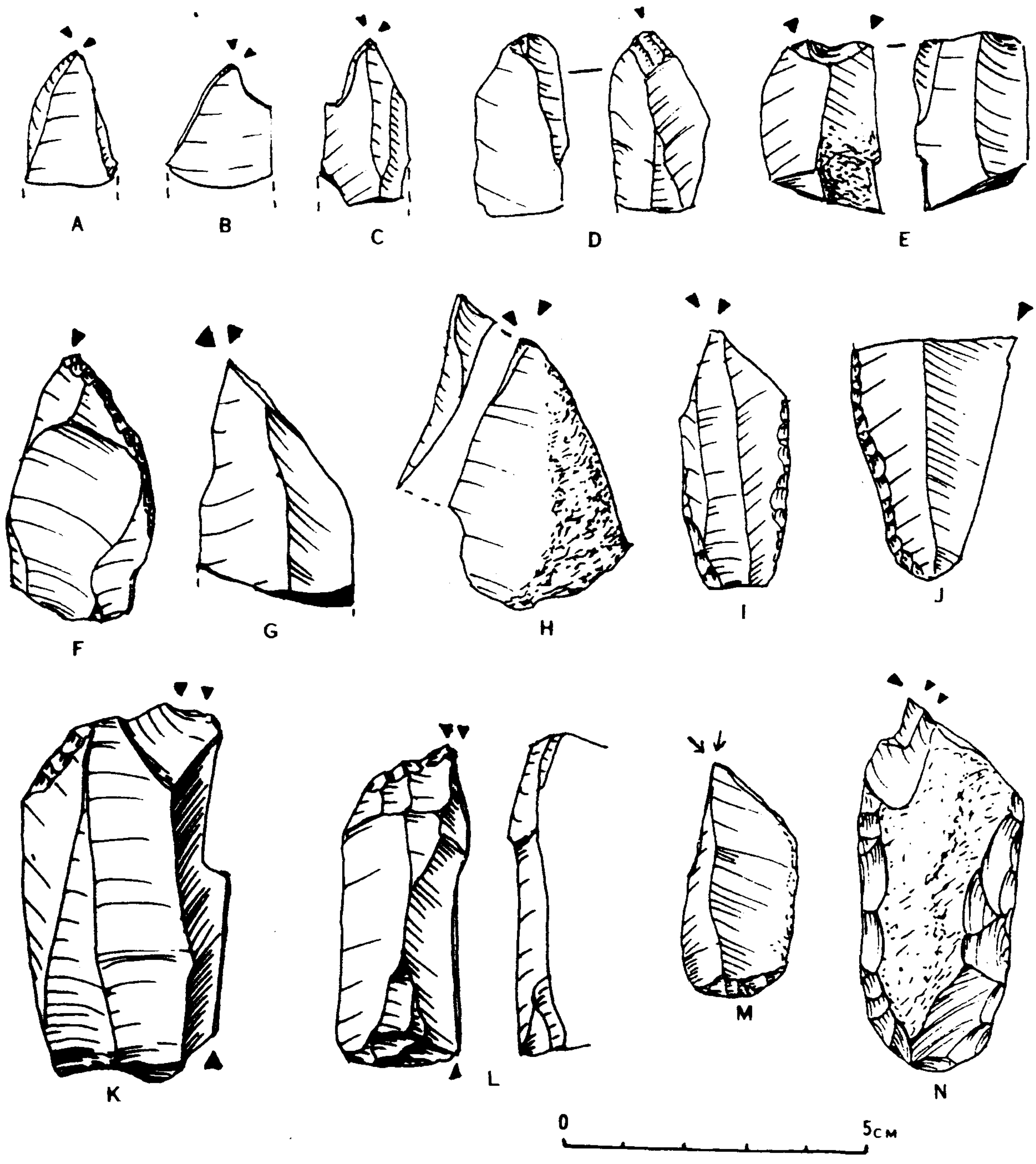

Fig. IX-12 Prismatic burins (K, L, N), light weight burins (E - J, M), and burins tips (A - C).

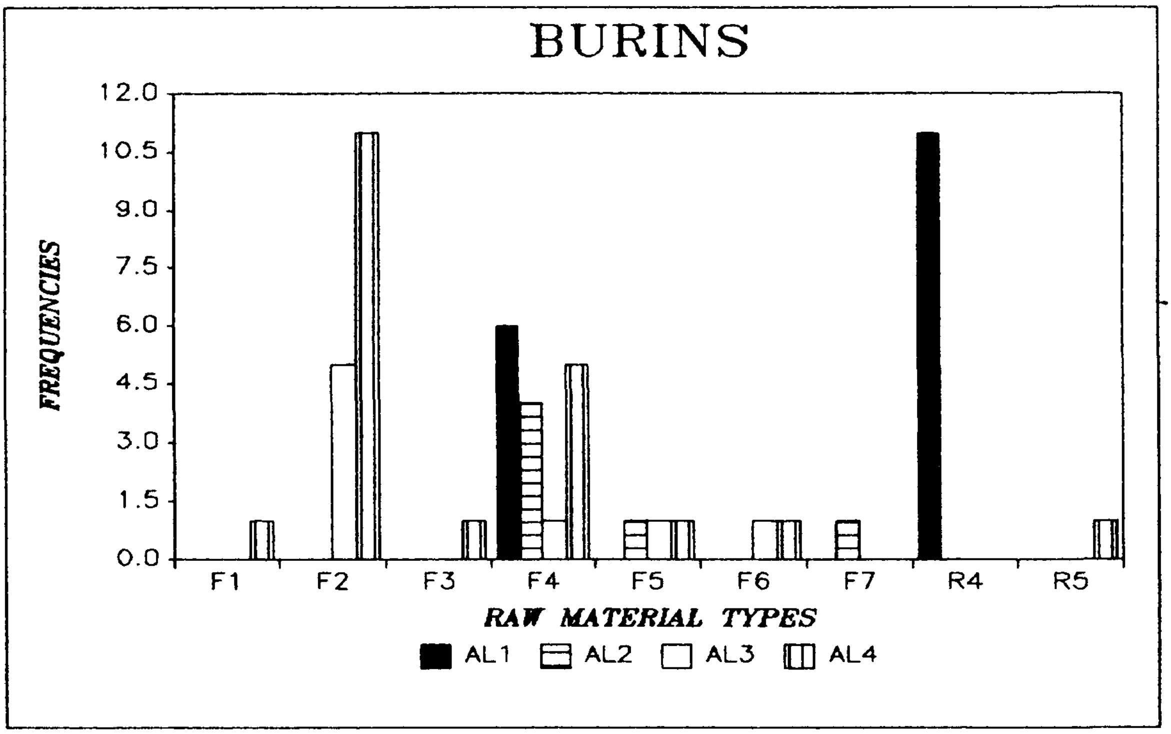

Fig. IX-12" Relative frequencies of burins by raw materials and by levels.

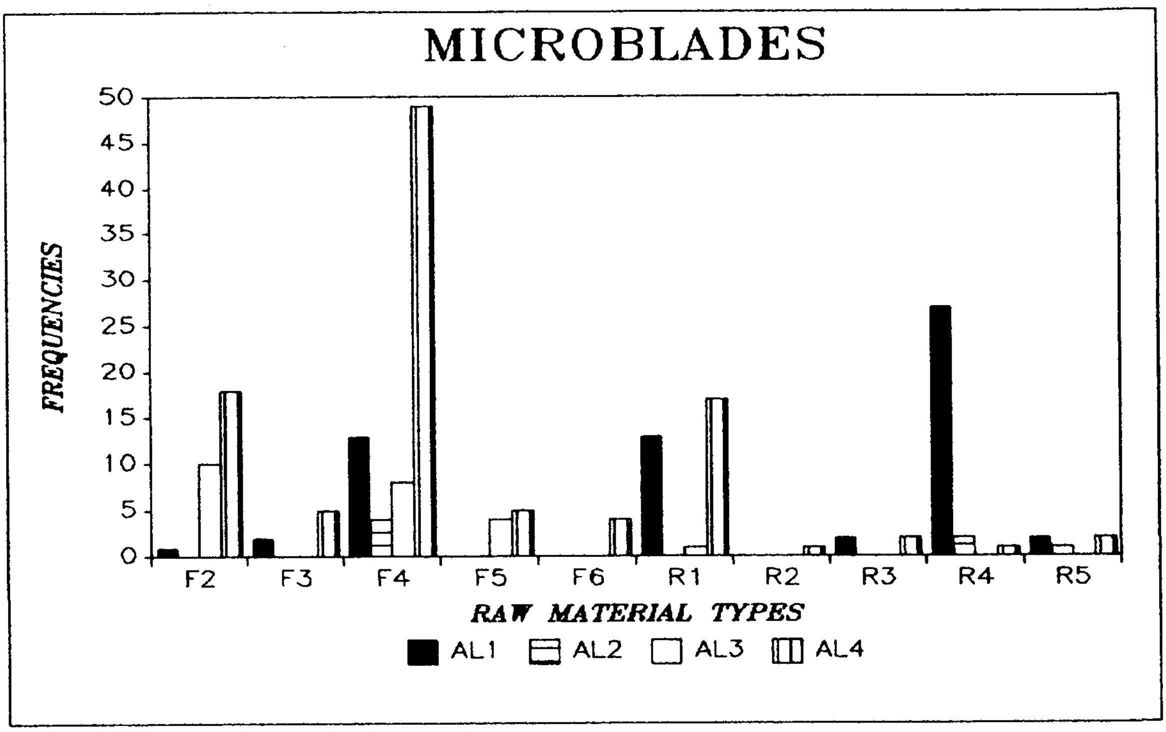

Fig. IX-12''' Relative frequencies of microblades by raw materials and by levels.

The larger artifacts are prismatic burins made on large and thick tabular flakes (Fig.IX-12, K, L, N). Prismatic burins are relatively numerous in the Gravettian industries from Willendorf. The presence of these forms in the Grubgraben assemblages may be viewed as indicative of the persistence of a particular Gravettian technology.

The smaller burins are dihedral, on snap or on truncation; they are made on blades, broken blades, and flakes (Fig. IX-12). In other words, the group of smaller burins is marked by a great deal of morphological and technological variability. All specimens show traces of sharpening. On the average, the proportion of burin spalls to burins is 4/5 to 1 (Table IX- 9). This figure may be taken as an estimate of the number of times a burin could be sharpened. To resharpen burins beyond that point, tips had to be snapped. Broken burin tips and burins on snap were probably the results of this sharpening technique.

We have not been able to refit spalls on burins, but, so far, attempts have been limited to specimens found within 4 square meters. Still, this suggests that burins were used, sharpened and carried away. The recovery of twelve brown radiolarite spalls in AL4 and 3 in AL3 where no burins of this material occurred confirm this interpretation.

Armatures

The group of armatures includes several varieties of modified microlithic blades among which are: flechettes, a series of microlithic blades with continuous, fine, abrupt and direct lines of retouch along one or both lateral edges (Fig. IX-13 F,H); backed bladelet elements, which include small (Fig. IX-13 A) and microlithic (Fig. IX-13 G) blades that are often broken and are characterized by a steep, abrupt, uni-directional line of retouch; and a variety of truncated pieces. Among the latter are microlithic pieces with a steeply retouched transverse edge (Fig. IX-13 B). The small truncated blades (Fig. IX-13 K, O) constitute a somewhat larger variant of the same form. Truncated edges associated with lateral retouch occur on small blades (Fig. IX-13 I, J , R) as well as on microlithic blades (Fig. IX-13 C,D). The first could be viewed as prototypes of the geometric armatures which developed in final Paleolithic assemblages. The thin, truncated and backed microblades are to be associated with a well defined armature type of Epigravettian industries. The one example of a small blade with two opposed truncated edges is to be associated with the group of proto-geometric (Fig. IX-13 E).

Armatures constitute 10% of the tool assemblage in AL3, 15% in AL2, 16% in AL1 and 20% in AL4. White flint is the material most commonly used in the AL4 assemblage along with patined flint and brown radiolarite whereas green radiolarite appears to have been the preferred material in AL1 (Table IX-9, Fig. IX-12'''). It should be pointed out that some of the armatures are made of rare and exotic raw materials. One of the specimens of backed and truncated blades from AL4 (Fig. IX-13 I) is made of a kind of fine grained quartzite. It is the only example of the material at the site. And one fragment of backed bladelet, from AL4 as well, is of rock crystal.

Flechettes and backed bladelet elements are present in all four assemblages. Flechettes have been described in the Aurignacian and early Gravettian levels of Willendorf (Otte, 1981) and, therefore, must be considered part of the Upper Paleolithic tool kit of the region. Small backed bladelets are abundant in later Gravettian phases along with shoulder points (Kozlowski, 1986) and become a predominant element of the Epigravettian of the Central European Basin, notably at Sagvar and Kadar (Montet-White *et al.*, 1986). Various types of truncated blades are also present at the latter two sites.

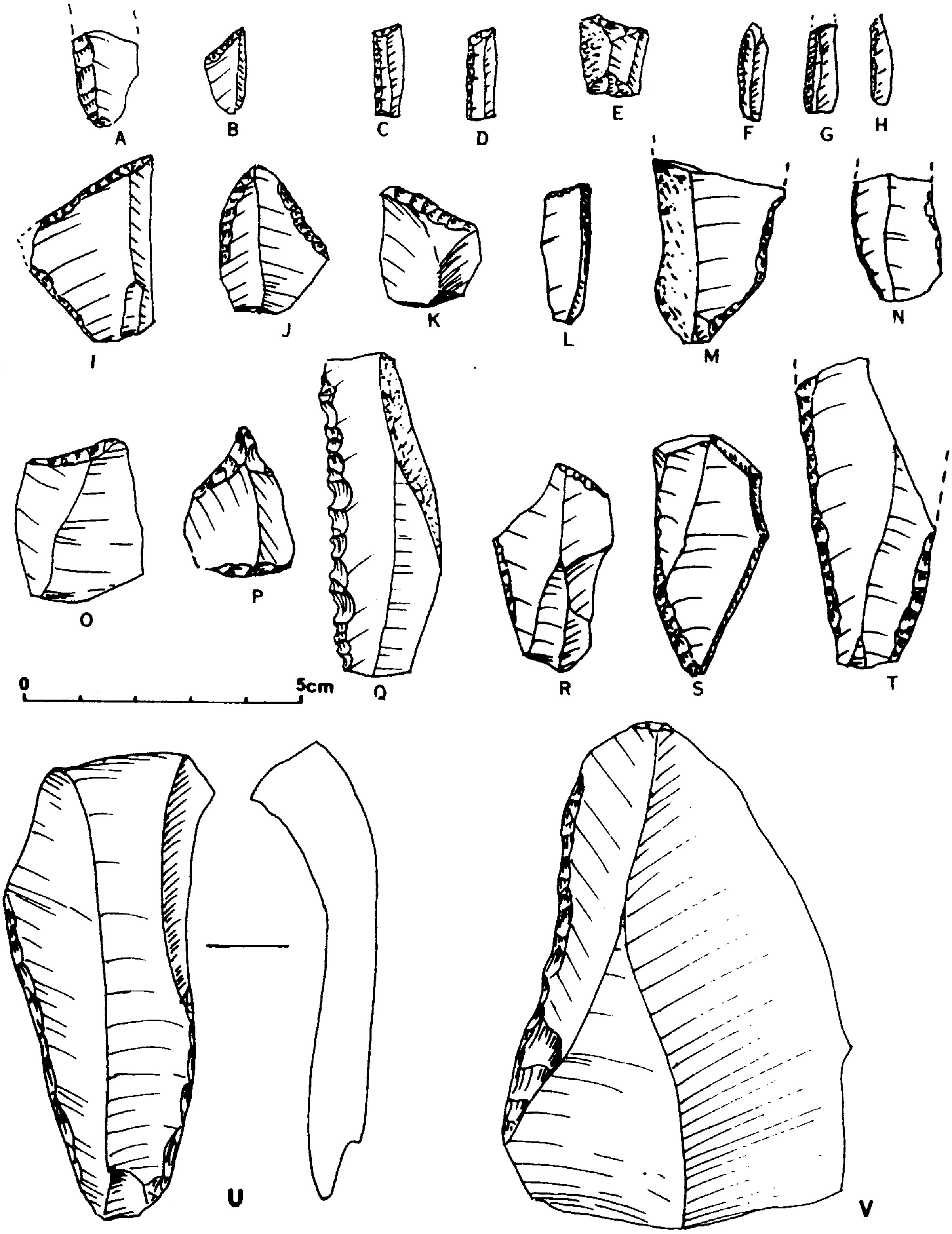

Fig. IX-13 Armatures: flechettes (F-H), backed bladelet (A), truncated bladelet (B) and blade (K,O), backed and truncated bladelets (C, D) and blade (I, J, R), piercer (P), blade with marginal retouch: fine (N), abrupt (M), scalar (S,T, U) and denticulate (Q), side-scrapers (V).

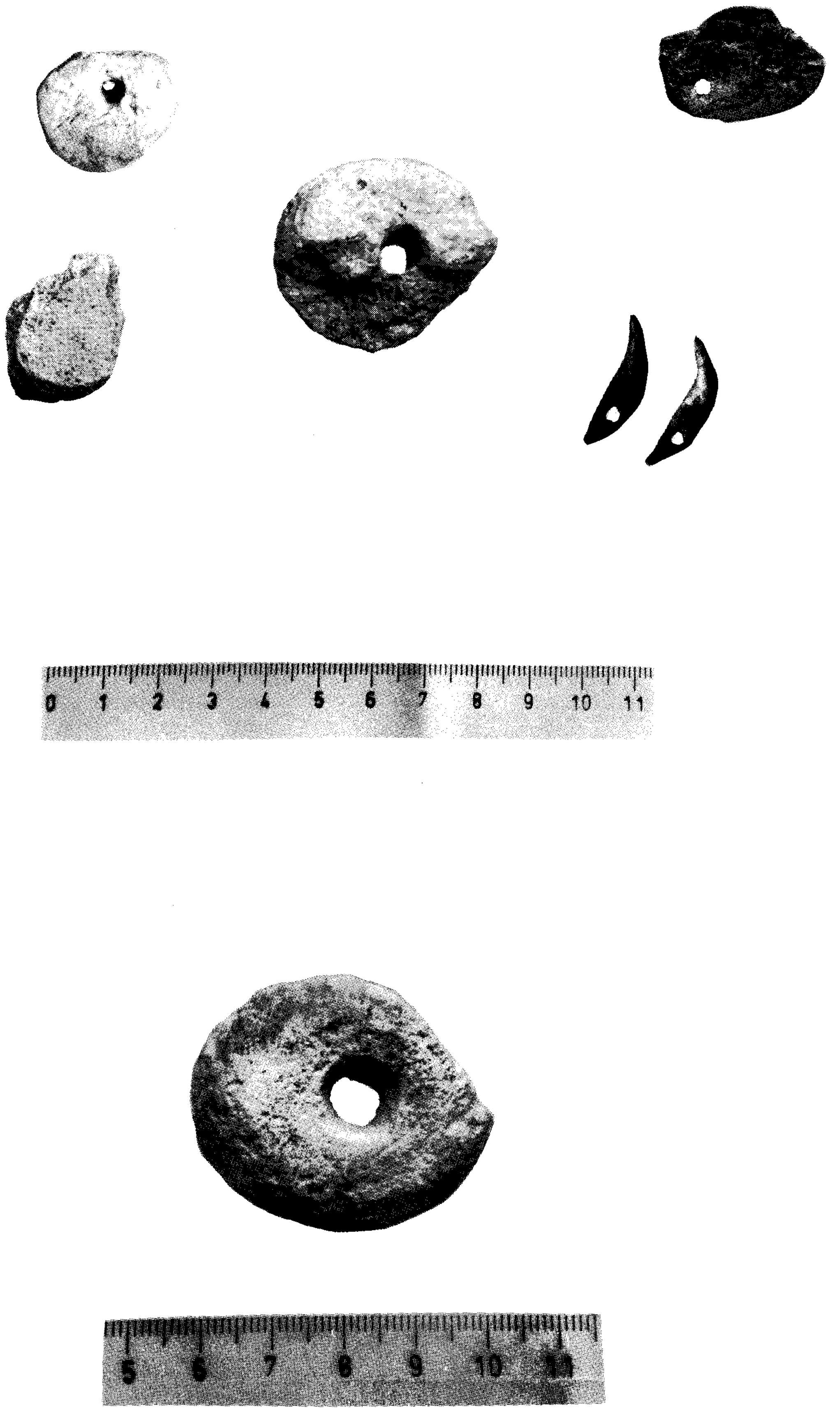

Fig. IX-14 Ornaments: pierced fox teeth, perforated stones.

The microlithic backed and truncated elements have been found only in AL1. This well characterized armature type was recorded at Sagvar in a assemblage dated at 17,760 BP as well as at several Slovenian sites in particular in level A/B of Zupanov Spodmol dated at 16,780 SP and Ovcja Jama (Montet-White and Kozlowski, 1983). At all these sites, the type is represented by a few specimens. However, their occurrence seems to fall within a limited time period around 17,000 BP and they appear to be distributed along the western edge of the Central European Basin.

Other Tools

Marginally retouched blades are relatively abundant in the AL1 workshop where they constitute 19% of the tool assemblage but are rare in the other levels where their relative frequency is between 4.5% and 6%. It may be that in the lower levels quartz and granulite flake knives were substituted for flint and radiolarite blades, especially in areas where butchering was the main activity.

Both the fine abrupt and the scalar retouch are present although not on the same specimens. In most cases, retouch is limited to the distal and/or the proximal section of the blade margins (Fig. IX-13 S, U). Many specimens are broken, either by a single fracture originating from the dorsal face (Fig. IX-13 M, N) or by multiple fractures (Fig. IX -13 T). A single specimen of naturally backed blade with a denticulated cutting edge (Fig. IX-13 O) may be a fortuitous accident.

Splintered pieces occur in AL3 and AL4. They are made from patined flint and white flint blade fragments (Fig. IX-8 R) or core fragments (Fig. IX-8 S). Series of small scalar traces along the working edge battering marks suggest that these pieces may have been used as wedges for splitting bones. Their association with areas where there are quantities of split long bones tends to support this view.

Ornaments

Mention should be made of the perforated stones and shells which were recovered at the site (Fig, IX-14). Dentalia are the most common ornament type. They occur in a variety of sizes. A number of specimens have been cut at the site. The origin of the dentalia is still uncertain but there seems to be a strong possibility that they were not fossil forms found in the Pannonian Basin (Steininger, personal communication).

Two stone beads were recovered from AL4. The smaller specimen made of light weight tuffa was decorated with irregular stripes suggesting the outer surface of a sea shell. The larger one, made of limestone, was cut and polished. The perforation had been done by drilling from both surfaces. A small portion broke off probably during the drilling process.

Another fragment of polished limestone was not drilled. A small piece of slate, oblong in shape had been smootherd and perforated near one of the narrow ends. Three fox teeth had been drilled for suspension.

Summary

The Grubgraben AL4, AL3 and AL2 assemblages belong to an Epigravettian phase with flechettes and small backed elements.

The AL1 assemblage which, in the 1986/87 excavation trench and in the graben is separated from the other levels by at least one meter of loess deposits, is characterized as an Epigravettian with backed bladelets and microlithic, truncated and backed elements. The AL1 assemblage can be characterized also as a specialized tool kit consisting mostly of burins and knives (marginally retouched and unretouched blades) and a few scrapers associated with grinding stones (pitted and broken sandstone slabs), ocher and cut dentalia. It is difficult to identify the function(s) of such a tool kit. The question of its interpretation will have to be re-examined in the context of more extensive excavations of level 1 . The preparation and knapping of one chunk of flint took place at the edge of the workshop.

The AL2 assemblage is a small but diversified assemblage of flint and radiolarite tools, including scrapers, retouched and unretouched blades and flakes, one burin and one splintered piece, and a few quartz flakes. As the tools were scattered around the hearth along with food debris, the assemblage may be interpreted as being associated with cutting meat, cooking and other domestic activities. Microwear analysis of scraper edges may help determine more precisely the end scrapers function(s).

The AL3 and AL4 assemblages are very similar. They include several kinds of scrapers (endscapers made from a variety of blanks which were heavily used, sharpened and recycled, carinates and unguiforms), a small variety of burins and some heavier prismatic burins, piercers and cutting tools which include quartz and granulite flakes as well as flint and radiolarite blades, splintered pieces perhaps used as wedges and a variety of hammerstones. The variety and relative complexity of the assemblages probably reflect a wide range of activities.

The most obvious characteristics of all four of the Grubgraben assemblages are the small number of large trimming flakes, the very small size of the chipping debris and the intensive reduction of cores and tools.

TABLE IX-3: Cores

	AL1		AL2		AL3		AL4	
	#	wt	#	wt	#	wt	#	wt
F1					1	24	1	19
F2	1	76	1	17	1	39	9	157
F3							2	80
F4			3	503	2	93	2	30
F5	1	29	1	66			4	122
F6			2	23				
F7	1	13					1	6
F8								
F9								
R1	1	12	1	41			4	41
R2							1	32
R3								
R4	1	13	1	102				
R5	2	35	1	37			3	191
R9								
T.	7	178	10	789	4	156	27	678

TABLE IX-4: Flakes

	AL0		AL1		AL2		AL3		AL4		AL3/4	
	#	WT	#	WT	#	WT	#	WT	#	WT	#WT	
F1									5	37		
F2	1	1	6	7	3	25	35	77	211	548	5	8
F3			2	2	3	25	2	6	28	113		
F4	1	4	66	377	24	56	51	98	276	466	8	5
F5			3	3	25	58	20	41	131	305	4	3
F6					7	39	12	34	41	107	1	0
F7	3	3	2	2	5	13	4	7				
F8									1	1		
F9					1	1	1	8	2	9		
R1	1	0	32	86	7	30	18	58	39	82		
R2			1	0	1	8	3	4	12	27		
R3	1	1	1	3	3	6			1	1		
R4	4	10	87	308	8	17	2	3	12	26		
R5			11	27	8	25	4	46	19	60		
R9					1	2	1	0				
Misc.			1	1			2	4	1	1		

TABLE IX-5
Blades

	AL1		AL2		AL3		AL4	
	#	wt	#	wt	#	wt	#	wt
F1							1	4
F2	6	25	2	7	8	67	69	171
F3			1	38			8	24
F4	5	104	7	21	7	26	81	153
F5	4	8	7	21	17	28	27	95
F6			2	8	3	8	8	29
F7	2	8	1	5			3	18
F8								
F9							2	3
R1	15	47					14	53
R2			1	0	2	8	2	3
R3								
R4	46	98	2	5	1	3		
R5	6	15	2	6	1	2	6	15
R9								
Misc.	1	4						
Total	105		25		50		221	

TABLE IX-6 FLINT AND RADIOLARITE TOOL COUNTS

		AL1	AL2	AL3	AL4
1a	endscrapers on blade	0	2	1	9
1b	" " on broken blade	2	1	2	14
3a	" " on retouched bl.	0	2	2	12
3b	" " on broken ret. b	3	1	2	1
7	scrapers on flakes	3	1	5	7
8	circular scrapers		1	0	3
9	unguiform scrapers	0	1	2	2
11	carinates	0	1	1	6
13	shouldered scrapers	0	1	0	2
17	scraper-burins	2	0	0	1
19	burin-trunc. blade	0	0	1	0
20	scraper-piercers	0	0	0	1
22	piercers	0	1	1	4
28	dihedral burins	21	0	2	5
30	burins on snap	2	1	1	6
32	prismatic burins	4	0	3	7
34	burins on truncation	2	0	2	4
38	burins on notch	1	0	0	1
60	truncated blades	1	0	3	7
65	marg. ret. blades	6	2	2	3
65a	" " with fine retouch	5	1	1	4
74	notches	0	0	0	3
75	denticulates	0	0	1	1
77	side-scrapers	2	2	2	4
78	raclettes	0	0	0	2
83	flechettes	5	2	1	25
85	backed bladelets	2	2	2	5
86	truncated backed blt	3	0	1	0
91	splintered pieces	0	1	4	16
	TOTAL	63	23	42	155

TOOL GROUPS :		%	%	%	%
SCRAPERS	SCR	17.54	52.20	40.34	36.32
BURINS	BUR	45.61	6	14.27	15.60
MARGINAL RETOUCH	MRB	19.30	30	9.01	5.85
TRUNCATED BLADES	TRB	1.75	0	5.26	4.55
PIERCERS	PER	0.00	6	5.26	3.25
SPLINTERED PIECES	SPL	0.00	0	8.77	10.39
ARMATURES	ARM	14.03	12	9.25	19.48

Table IX-7
Scrapers

	AL1		AL2		AL3		AL4		AL3/4	
	N	WT	N	WT	N	WT	N	WT	N	WT
F1							1	16	1	10
F2	1	1	3	21	6	43	24	170	4	23
F3					1	8	5	48		
F4	4	40	3	23	1	3	12	48		
F5			3	32	2	14	7	100	1	8
F6	1	10	2	12	2	15	7	73		
F7			2	14	1	4	1	5		
F8										
F9										
R1	2	31	2	20	2	21				
R2			1	14						
R3										
R4	5	106					3	33		
R5			1	7						
R9					1	12				
Total	13		17		22		60			

TABLE IX-8
Burins

	AL0		AL1		AL2		AL3		AL4		AL3/4	
	#	WT	#	WT	#	WT	#	WT	#	WT	#	WT
F1									1	5		
F2							5	35	11	67	2	23
F3									1	2		
F4			6	52	4	21	1	2	5	32		
F5					1	19	1	23	1	14		
F6							1	7	1	11		
F7					1	2						
F8												
F9												
R1												
R2												
R3												
R4			11	67								
R5									1	2		
R9												
Total			17		6		8		21			

Table IX-9
Bladelets and Armatures

	AL0		AL1		AL2		AL3		AL4		AL3/4	
	#	WT	#	WT	#	WT	#	WT	#	WT	#	WT
F1												
F2	1	-	1	-			10	7	18	26	2	1
F3			2	-				5	2			
F4			13	2	6	4	8	4	49	17	1	-
F5							4	3	5	1		
F6								4	1	1	1	
F7												
F8												
F9												
R1			13	2			3	1	17	3	1	-
R2								1	-			
R3			2	-				2	-			
R4			27	9	2	2		1	-			
R5			2	-	1	1		2	2	2	-	
R9												
Total	10		60		9		25		104		7	