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12 - UNIT F: LITHIC ARTIFACTS

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General artifact category representation

During the 1990s excavations, four archaeological levels from Unit F yielded the following lithic assemblages (stratigraphically from bottom to top): level Fc – 63 pieces, level Fb1-Fb2 – 6900 pieces, level Fa3 – 407 pieces, and level Fa1-Fa2 – 205 pieces. Levels Fb1-Fb2 and Fa1-Fa2 are each composed of two sub-levels, the number of artifacts and their categories from each sub-level is given in table 1. The three lower levels (Fc, Fb1-Fb2, Fa3) contain hearths/fireplaces and/or ashy lenses – strong evidence of human activities within the rock-shelter, while uppermost level Fa1-Fa2 lacks such features, probably due to natural disturbance. Aside from the artifact frequencies for each level, their proportional representation within the unit is much more indicative: level Fc – 0.8%, level Fb1-Fb2 – 91.1%, level Fa3 – 5.4%, and level Fa1-Fa2 – 2.7%. The clear overwhelming majority of level Fb1-Fb2 finds is once more confirmed by a good representation in this assemblage of core-like pieces and tools that constitute "a core sample" for all Unit F lithics. So, of all Unit F 23 core-like pieces, 20 (87%) are found in level Fb1-Fb2. In addition, 152 tools in this level comprise 83.5% of all Unit F 182 tools. At first sight, such distribution of Unit F artifacts between the four levels would not appear to allow us to carry out a comparative analysis between these levels, but this is not the case. Percentage intervals for basic artifact categories are as follows: core-like pieces – 0-0.5%, core maintenance products – 2.3-7.9%, debitage – 27.3-57.2%, tools – 2.2-6.3%, waste from tools production and rejuvenation (mainly, burin spalls) – 0-1.0%, debris – 28.6-67.2% (see tabl. 1). This shows insignificant variation in core maintenance products between levels, despite the absence of core-like pieces in level Fc. There are also just slight differences for tools and waste from tool production and rejuvenation (mainly burin spalls) between levels. In this connection, the lack of burin spalls in level Fc is readily explained by the lack of burins themselves there and, at the same time, the importance of the percentage of tools (6.3%) for level Fc should not be exaggerated as there are only four tools among the 63 flints here. Thus, the real differences are connected only to debitage and debris, but their representations are correlated (!). On one hand, level Fb1-Fb2 has the lowest debitage representation (27.3%) and the highest debris representation (67.2%). On the other hand, level Fc is known by the highest debitage rate (57.2%) and the lowest level of debris (28.6%). Given this and the small area excavated in the 1990s (12 sq. meters), we can assume that the small flint assemblages from levels Fc, Fa3 and Fa1-Fa2 represent merely small fractions or peripheral sections of human activities at the rock-shelter with quite limited primary and secondary flint treatment processes, while the large assemblage from level Fb1-Fb2 is evidence of intensive flint exploitation during multiple human occupations in this structurally complex level.

The observed differences in the representation of some artifact categories within Unit F are not accompanied by any techno-typological changes throughout the Unit F archaeological sequence. Aurignacian carinated cores for bladelet production are present in both level Fb1-Fb2 (7 of all 20 core-like pieces) and level Fa3 (both core-like pieces are carinated); their absence in level Fa1-Fa2 is not important, given the presence of a single multiplatform core there that may have originally been carinated before further heavy reduction and transformation into a multiplatform core. All main Aurignacian and Indicative Upper Paleolithic tool types and non-geometric microliths are observed in each of the Unit F four levels. We can therefore state that the finds from all four levels of Unit F represent a homogeneous Aurignacian assemblage.

Typological structure of artifacts

Core-like pieces

In total, this artifact category is represented in levels Fb1-Fb2, Fa3 and Fa1-Fa2 by 23 items (see tabl. 2).

Level Fb1-Fb2

The following 20 core-like pieces were identified: 1 pre-core, 17 cores and 2 core fragments. The 17 cores are typologically, subdivided into 1 blade/bladelet core, 10 bladelet cores, 3 flake/bladelet cores and 3 unidentifiable cores. All core-like pieces are made on gray flints. The core-like pieces' blank types will be noted below for each individual specimen.

	Level Fc			Level Fb1-Fb2					Level Fa3			Level Fa1-Fa2				
	N	%	esse %	Fb2	Fb1	N	%	esse %	N	%	esse %	Fa2	Fa1	N	%	esse %
Core-Like Pieces				11	9	20	*0.3*	*0.9*	2	*0.5*	*0.8*	1		1	*0.5*	*0.8*
Core Maintenance Products	5	*7.9*	*11.1*	110	47	157	*2.3*	*6.9*	30	*7.4*	*12.3*	13		13	*6.3*	*9.9*
Debitage:	36	*57.2*	*80.0*	1317	566	1883	*27.3*	*83.3*	192	*47.2*	*78.7*	94	12	106	*51.7*	*80.9*
Flakes	12	*19.1*	*26.7*	284	139	423	*6.1*	*18.7*	63	*15.5*	*25.8*	36	6	42	*20.5*	*32.1*
Blades	7	*11.1*	*15.6*	76	35	111	*1.6*	*5.0*	30	*7.4*	*12.3*	12	1	13	*6.3*	*9.9*
Bladelets	8	*12.7*	*17.7*	228	130	358	*5.2*	*15.8*	55	*13.5*	*22.6*	28	4	32	*15.6*	*24.4*
Microblades	9	*14.3*	*20.0*	729	262	991	*14.4*	*43.8*	44	*10.8*	*18.0*	18	1	19	*9.3*	*14.5*
Tools	4	*6.3*	*8.9*	115	37	152	*2.2*	*6.7*	17	*4.2*	*7.0*	8	1	9	*4.4*	*6.9*
Waste From Production & Rejuvenation of Tools				37	13	50	*0.7*	*2.2*	3	*0.7*	*1.2*	2		2	*1.0*	*1.5*
Debris:	18	*28.6*		3500	1138	4638	*67.2*		163	*40.0*		70	4	74	*36.1*	
Chips	10	*15.9*		2885	1001	3886	*56.3*		128	*31.4*		50	3	53	*25.8*	
Uncharacteristic Debitage Pieces	8	*12.7*		129	55	184	*2.7*		19	*4.7*		16	1	17	*8.3*	
Chunks				11	9	20	*0.3*		11	*2.7*		1		1	*0.5*	
Heavily Burnt Pieces				475	73	548	*7.9*		5	*1.2*		3		3	*1.5*	
TOTAL	**63**	100.0	100.0	5090	1810	**6900**	100.0	100.0	**407**	100.0	100.0	188	17	**205**	100.0	100.0

Table 1 - Siuren-I. Unit F. General Lithic Artifacts Categories Representation by Level and Sub-Level.

Groups & Types	Level Fc	Level Fb1-Fb2	Level Fa3	Level Fa1-Fa2	TOTAL
PRE-CORES		**1**	**1**		**2**
CORES		**17**	**1**	**1**	**19**
Blade / Bladelet Cores					**1**
- double-platform bidirectional-adjacent sub-cylindrical		1			
Bladelet Regular Cores					**3**
- double-platform bidirectional rectangular		1			
- double-platform bidirectional-adjacent rectangular		1			
- double-platform bidirectional-alternate rectangular		1			
Bladelet Carinated Cores					**4**
- single-platform sub-cylindrical		1	1		
- single-platform sub-pyramidal		1			
- double-platform bidirectional-adjacent sub-cylindrical		1			
Bladelet "Advanced" Carinated Core					**1**
- single-platform pyramidal		1			
Bladelet Narrow Flaked Cores / "Carinated Burins"					**3**
- single-platform		3			
Flake-Bladelet Cores					**4**
- *multiplatform exhausted*		3		1	
Unidentifiable Cores		3			**3**
CORE FRAGMENTS		**2**			**2**
TOTAL	**0**	**20**	**2**	**1**	**23**

Table 2 - Siuren-I. Unit F. Core-like Pieces Classification.

The Pre-Core is an initial double-platform piece with bidirectional-adjacent disposition of two striking platforms (1 plain semi-acute and 1 crudely-faceted semi-acute) and two flaking surfaces. This pre-core reflects an initial attempt at regular core reduction after decortification/preparation of a nodule by removal of some flakes and blades, based on their negatives. Unfortunately, this attempt was unsuccessful, as seen by the fact that debitage pieces removed from both striking platforms are heavily hinged, reached only about one-third of the pre-core's overall length, and obviously spoiled the pre-core's flaking surfaces for any further reduction. Due to the hinged character of intentional removals, their identification (flakes/blades/bladelets?) remains unknown. The pre-core is 4.3 cm long, 3.5 cm wide and 3.1 cm thick.

The Blade/Bladelet Core (fig. 1:1) is a double-platform bidirectional-adjacent one of volumetric character with sub-cylindrical shape and two flaking surfaces. Platform types and angles: 1 plain semi-acute and 1 crudely-faceted acute. Platform abrasion: present for the plain semi-acute platform and absent for the crudely-faceted acute one. Platform morphology in plane and removal scars on flaking surfaces: 1 semicircular with no twisted scars and 1 straight with no twisted scars. Condition of flaking surfaces: both regular. Metrics: length – 5.3 cm, width – 2.2 cm, thickness – 1.5 cm. First platform's width and thickness: 1.7 cm and 0.8 cm. Second platform's width and thickness: 1.6 cm and 2.4 cm. Size of the plain platform indicates removal of a core tablet with flake proportions for possible rejuvenation. Platform negatives' maximum length: the same as the core's length

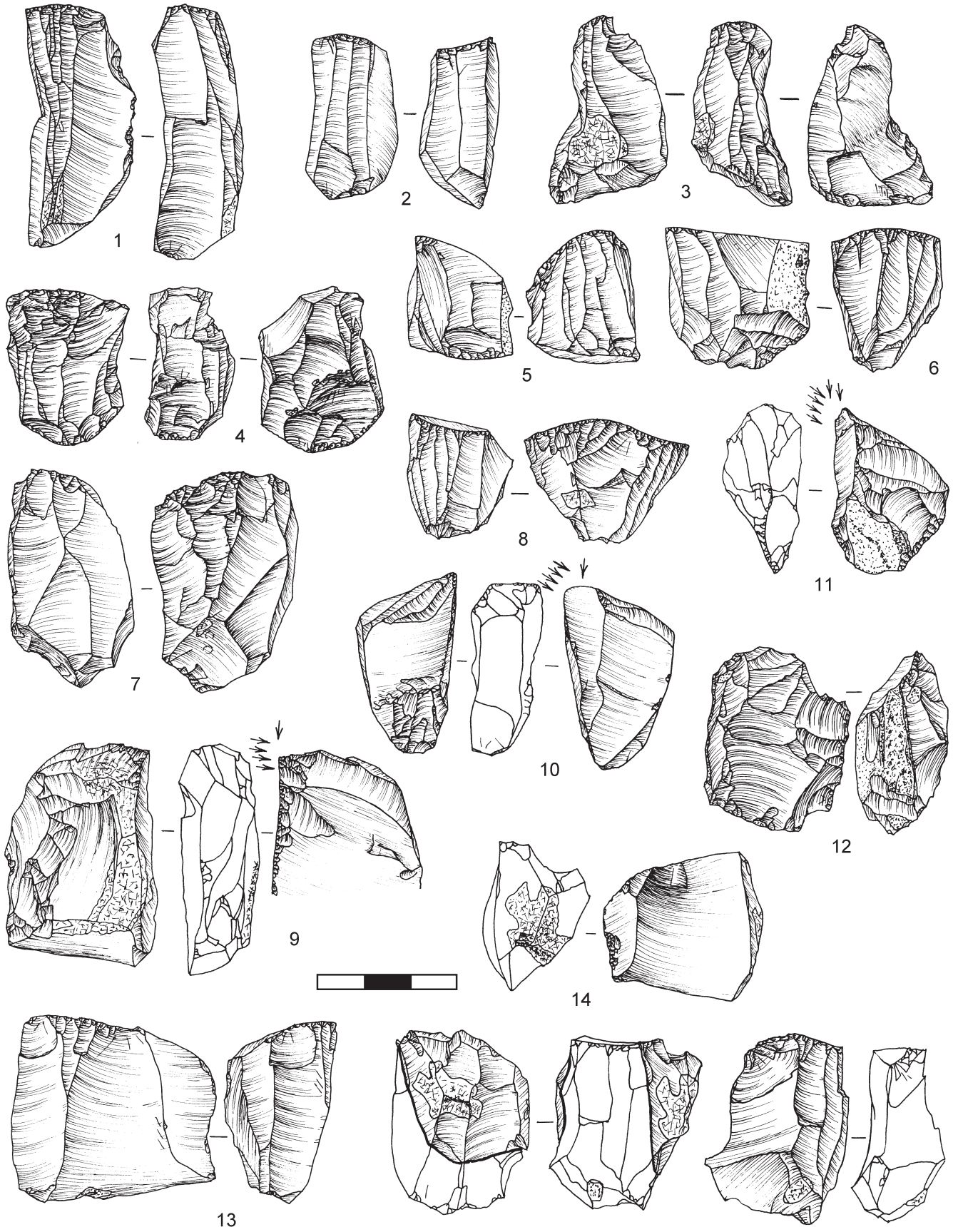

Figure 1 - Siuren I. Unit F, level Fb1-Fb2. Flint Artifacts – Cores. 1, double-platform bidirectional-adjacent sub-cylindrical blade/bladelet core; 2, double-platform bidirectional rectangular bladelet core; 3, double-platform bidirectional-adjacent rectangular bladelet core; 4, double-platform bidirectional-alternate rectangular bladelet core; 5, "carinated" single-platform sub-cylindrical bladelet core; 6, "carinated" single-platform sub-pyramidal shape bladelet core; 7, "carinated" double-platform bidirectional-adjacent sub-cylindrical bladelet core; 8, "advanced" "carinated" single-platform pyramidal bladelet core; 9-11, narrow flaked single-platform bladelet cores/"carinated burins"; 12, flake/bladelet core; 13, unidentifiable core; 14, unidentifiable core with refitted heavily overpassed flake (last removal).

– 5.3 cm. Reason for abandonment: small overall size and particularly thickness of the plain striking platform, as well as the small thickness of the core for further primary reduction. The blank type is likely a thick blade.

For bladelet cores in level Fb1-Fb2, 3 regular cores, 3 carinated cores, 1 "advanced" carinated core and 3 narrow flaked cores were identified. Descriptions of these 10 cores will be done separately for each of these four sub-groups.

Bladelet Regular Cores are all double-platform specimens of non-volumetric character with rectangular shape. Differences between the three cores are only in the disposition of two striking platforms and 1-2 flaking surfaces.

The first (fig. 1:2) is a double-platform bidirectional rectangular one with bladelets/microblades removed from two opposing striking platforms located on a single flaking surface. The core is quite exhausted, showing the last regular reduction of the small residual piece. Platform types and angles: 1 plain acute and 1 plain semi-acute. Platform abrasion: present on both platforms. Platform morphology in plane and removal scars on flaking surfaces: both straight with no twisted scars. Condition of flaking surfaces: both regular. Metrics: length – 3.6 cm, width and thickness – 1.5 cm each. First platform's width and thickness – 1.2 cm and 1.5 cm. Second platform's width and thickness – 1.5 cm and 1.4 cm. Such dimensions of both striking platforms indicate possible removal of core tablets with flake proportions for their rejuvenation. Platform negatives' maximum length: the same as the core's length – 3.6 cm. Reason for abandonment: no obvious reason, although the core is certainly small. The blank type is unknown because of heavy reduction.

The second core (fig. 1:3) is a double-platform bidirectional-adjacent rectangular one with two flaking surfaces. Platform types and angles: both plain acute. Platform abrasion: present on both platforms. Platform morphology in plane and removal scars on flaking surfaces: 1 semicircular with no twisted scars and 1 straight with no twisted scars. Condition of flaking surfaces: 1 regular and 1 hinged. Metrics: length – 3.8 cm, width and thickness – 2.3 cm each. First platform's width and thickness – 1.3 cm and 1.0 cm. Second platform's width and thickness – 2.3 cm and 2.1 cm. Such dimensions of both striking platforms indicate possible rejuvenation through removal of core tablets with flake proportions. Platform negatives' maximum length: 3.8 cm and 3.1 cm, which is exactly the whole length of each flaking surface. Reason for abandonment: one flaking surface is regular but the striking platform is too small (1.3 x 1.0 cm), while the second flaking surface is hinged, although its striking platform is still sizable (2.3 x 2.1 cm). The core is quite exhausted. The blank type is a nodule/chunk.

The third core (fig. 1:4) is a double-platform bidirectional-alternate rectangular one with two flaking surfaces (on one flaking surface on each of two core's sides). Platform types and angles: 1 crudely-faceted right and 1 crudely-faceted acute. Platform abrasion: present on both platforms. Platform morphology in plane and removal scars on flaking surfaces: both straight with no twisted scars. Condition of flaking surfaces: both hinged. Metrics: length – 3.3 cm, width – 2.6 cm, thickness – 1.7 cm (although without taking into account the convexity on flaking surfaces due to hinging parts, thickness is only 1.0 cm). First platform's width and thickness – 2.5 cm and 1.1 cm. Second platform's width and thickness: 1.9 cm and 0.6 cm. Platform negatives' maximum length: the same as the core's length – 3.3 cm. Reason for abandonment: both flaking surfaces hinged, small overall thickness of the core and small thickness of both striking platforms. The blank type is unknown but is probably a nodule/chunk.

Bladelet Carinated Cores of volumetric character include 2 single-platform and 1 double-platform specimens.

The first bladelet carinated single-platform core (fig. 1:5) has sub-cylindrical shape. Platform type and angle: plain acute. Platform abrasion: present. Platform morphology in plane and removal scars on flaking surface: offset with twisted scars. Condition of flaking surface: regular. Metrics: 2.5 cm long, 2.4 cm wide and 2.4 cm thick. Platform width and thickness: 2.5 and 2.4 cm. Such platform size indicates removal of a core tablet with flake proportions for possible rejuvenation. Platform negatives' maximum length: the same as the core's length – 2.5 cm. Reason for abandonment: no obvious reason. The blank type is a nodule/chunk.

The second bladelet carinated single-platform core (fig. 1:6) has sub-pyramidal shape. Platform type and angle: plain semi-acute. Platform abrasion: present. Platform morphology in plane and removal scars on flaking surface: offset with twisted scars. Condition of flaking surface: regular. Metrics: length – 3.0 cm, width – 2.4 cm, thickness – 3.1 cm. Platform width and thickness: 2.4 cm and 3.1 cm. This platform could also have rejuvenated by removal of a core tablet with flake proportions. Platform negatives' maximum length: the same as the core's length – 3.0 cm. Reason for abandonment: no obvious reason. The blank type is a nodule/chunk.

The bladelet carinated double-platform core (fig. 1:7) is a bidirectional-adjacent one with two flaking surfaces and sub-cylindrical shape. It has some unusual features. The presence of some rather wide and large negatives on its flaking surfaces indicates blade production (initial preparation?) prior to bladelet production. The main morphological features of the two striking platforms and flaking surfaces are similar. Platform types and angles: both plain acute. Platform morphology in plane and removal scars on flaking surfaces: both offset with twisted scars. Condition of flaking surfaces: both regular. Metrics: length – 5.1 cm, width – 3.1 cm, thickness – 2.6 cm. However, metric data on platform width/thickness and negatives' maximum length are very different and indicate different typological definitions. One part of the core (one striking platform and one flaking surface) is a bladelet carinated core. The other part (one striking platform and one flaking surface) would be a thick shouldered end-scraper. So, the first part has such the following dimensions: platform width – 2.9 cm and thickness – 4.0 cm, and negatives' maximum length – 3.1 cm that corresponds well to bladelet carinated cores with smaller indices for striking platform width in comparison to their negatives' maximum length. The other part is characterized by reverse metric indices for striking platform's width (1.8 cm)/thickness (2.8 cm) and nega-

tives' maximum length (1.6 cm) that, in conjunction with its clear "one-sided notch"/"offset core morphology in plane", meets the parameters of thick shouldered end-scrapers. Such a combination of two metrically different part of the core show obvious artificial metric boundaries between carinated tools and bladelet carinated cores and strongly confirms the need for definite separation of "carinated pieces" in Aurignacian assemblages. Concluding the core's description, we also note that its blank type is a nodule/chunk and possible platform rejuvenation would likely have been done through removal of core tablets with flake proportions.

The bladelet "advanced" carinated core is a single-platform one of volumetric character with pyramidal shape (fig. 1:8). Strictly speaking, it is not a carinated core because of the pyramidal shape, as only sub-pyramidal and sub-cylindrical shapes are characteristic of "true" bladelet carinated cores. Nevertheless, we have decided to include this item with the carinated cores for the following reasons. This core shows morphological features typical for carinated cores, such as offset morphology in plane (two notches) and twisted scars on the flaking surface, as well as the presence of mainly scars with microblade width – evidence of not just general bladelet production but, indeed, mainly microblade reduction. Therefore, it was decided to place this piece in the bladelet carinated cores category under the conventional term "advanced carinated". Platform type and angle: plain right. Platform abrasion: present. Condition of flaking surface: regular. Metrics: length – 2.9 cm, width – 3.5 cm, thickness – 1.9 cm. Platform width and thickness – 3.5 cm and 2.2 cm. Forming of the striking platform was made by a single blow in longitudinal direction and such possible removal could have been a core tablet with blady proportions. Platform negatives' maximum length: the same as the core's length – 2.9 cm, which is less than platform width – 3.5 cm. In this case, if we exclude the pyramidal shape of the core, this matches the metric proportions of carinated end-scrapers. Accordingly, it also supports better attribution of this piece as a bladelet carinated core than simply a bladelet regular core. Reason for abandonment: no obvious reason. The blank type is a nodule/chunk.

Bladelet Narrow Flaked Single-Platform Cores/"Carinated Burins" (3 items: fig. 1:9-11) are very similar in morphological features which are summarized below. Platform type and angles: 2 plain acute and 1 plain right. Platform abrasion: present for all 3 cores. Platform morphology in plane and removal scars on flaking surfaces: all offset with twisted scars. Condition of flaking surfaces: all regular. Thus, this morphology corresponds well to bladelet carinated cores, but with the difference of the use of the narrow side for bladelet/microblade production. Metric data are given separately for each piece. The first (fig. 1:9) is 3.3 cm long, 1.6 cm wide, 4.7 cm thick; platform width and thickness are 1.3 cm and 4.7 cm (a core tablet with blade proportions may have been removed for rejuvenation), and platform negatives' maximum length is the same as the core's length – 3.3 cm, although the last removed bladelets/microblades were heavily hinged. The second (fig. 1:10) is 2.5 cm long, 1.5 cm wide and 3.4 cm thick. Its platform width and thickness are 1.5 cm and 3.1 cm (a core tablet with blade/bladelet proportions may have been removed for its formation) and platform negatives' maximum length is the same as the core's length – 2.5 cm. The third (fig. 1:11) is 2.9 cm long, 1.7 cm wide and 3.5 cm thick. Platform width and thickness are 1.7 cm and 3.4 cm (a core tablet with blade/bladelet proportions may have been removed), and platform negatives' maximum length is the same as the core's length – 2.9 cm. The greater thickness of all three cores in comparison to length is explained by using short wide flakes as blanks. Reasons for abandonment: there are no obvious reasons for any of the cores, but it can be noted that the final scars of first piece are hinged, that have led to its abandonment. So, all metric parameters, as well as morphology, support attribution as bladelet narrow flaked cores. There is, however, another typological choice for these three pieces – carinated burins. The formation of one striking platform by one blade/bladelet removal and then detachment from its negative a series of bladelets/microblades could be interpreted as the removal of burin spalls; a detachment of pronounced twisted "burin spalls" similar to those from carinated cores and tools; manufacturing of all three pieces on flakes and not on nodules/chunks is less typical for cores; finally, the presence of a notch at the end of serial scars on the third piece may be interpreted as a typical notch for a carinated (busked) burin. Only the greater than 1.0 cm width for "burins multifaceted verges" (1.3-1.7 cm) contradicts such definition of these items as carinated burins. Thus, in sum, we strictly typologically identify these three pieces as bladelet narrow flaked cores with subsequent agreement to include them in the "broad" index of carinated burins and carinated pieces.

Flake/Bladelet Cores (3 pieces) are very exhausted ones after very certain multiple reductions because of which the cores' final forms have an unusual combination of flake/bladelet scars removed from more than two striking platforms.

The first Flake/Bladelet Core (fig. 1:12) may be strictly morphologically classified as a triple-platform sub-crossed one with ovoid shape and one flaking surface which is non-volumetric due to exhaustion. Two striking platforms are plain with acute angles and another striking platform is crudely-faceted with acute angle. Other striking platform characteristics would be too subjective, as well as other morphological features of the core. The core is 3.7 cm long, 3.0 cm wide and 1.7 cm thick. The blank type is a nodule/chunk.

Two more Flake/Bladelet Cores are multiplatform unsystematic/shapeless ones with removal scars all over their sides and with no special order of striking platforms and flaking surfaces, where flaking surfaces served as striking platforms and vice versa. Both blanks are nodules/chunks, one of which is also burnt. They are 5.2 cm and 3.5 cm long, 4.1 cm and 3.1 cm wide, 1.9 cm and 2.6 cm thick.

Unidentifiable Cores (3 pieces: fig. 1:13-14) are classified as such not because of their fragmentation or exhausted character as each one is complete, but with very special features of flaking surfaces. Indeed, each core's flaking surface is characterized by only a single large and wide negative that occupies more than three-quarters of the flaking area. Moreover, two such negatives on two cores' flaking surfaces are heavily overpassed that indicate considerable reducing of the cores' distal parts as well (fig. 1:13). Thus, any real sense of primary reduction on these three cores can only be understand through refitting several debitage

pieces or the last removed flake or blade. The latter was possible for one of these cores (fig. 1:14). Refitting of such a flake shows flake/bladelet bidirectional-adjacent volumetric core reduction with sub-cylindrical shape on two flaking surfaces from two striking platforms. This refitting strengthens our definitions of these three cores as unidentifiable because their actual reduction could be of any kind and radically different from the final one which very conventionally may be typologically identified as flake/blade single-platform non-volumetric one that would not be not true at all. The blank types used for these three cores are nodules/chunks. Their overall sizes are as follows: length: 6.6 cm, 4.0 cm, 3.9 cm; width: 4.3 cm, 4.5 cm, 3. 1 cm; thickness: 2.5 cm, 2.2 cm, 2.8 cm.

Level Fa3

The two cores from this level include a bladelet pre-core and a bladelet carinated core made on gray flint nodules/chunks.

The Pre-Core (fig. 2:1) is quite unusual because it could be equally defined either as a bladelet pre-core or a carinated burin. Both of these possibilities will be discussed.

First, this piece, as a pre-core, is not an initial core or simply a tested piece of raw material. The blank is a broken blade core for which the striking platform's edge was then used for further narrow flaked reduction as a unilateral crested ridge, planned from a new plain acute striking platform prepared by a single blow at one end of this crested ridge. From this new striking platform an attempt was made to strike off a series of bladelets/microblades (no less than 4). All of these bladelets/microblades were heavily hinged and reaching a maximum length of only 2.5 cm based on the negatives on the 6.0 cm length of the crested ridge. After this, the pre-core was abandoned.

At the same time, the following use of a broken blade core is very similar to manufacture of a carinated burin where from a single facet's negative a series of burin spalls was removed along the other edge of the blank. The absence of abrasion at the "The burin termination" does not additionally contradict definition of this particular piece as a carinated burin, although pre-cores usually do not have traces of abrasion at their core striking platform edges.

On the other hand, the width of the single negative from which a series of "bladelets/microblades or burin spalls" was detached is too wide (1.2-2.2 cm) for a burin, given the proposed "arbitrary border" of 1.0 cm for core/burin platform width. Therefore, it was decided to identify this piece as a bladelet narrow flaked pre-core that otherwise would be included in the "broad" index of carinated burins and, as a whole, accepted as "a carinated piece". The same was proposed for three bladelet narrow flaked cores from level Fb1-Fb2.

The Bladelet Carinated Core (fig. 2:2) is a single-platform one of volumetric character with sub-cylindrical shape. Platform type and angle: plain semi-acute. Platform abrasion: present. Platform morphology in plane and removal scars on flaking surface: semicircular with no twisted scars. Condition of flaking surface: regular. Metrics: length, 5.1 cm; width, 2.8 cm; thickness, 4.0 cm. Platform width and thickness: 2.7 cm and 4.4 cm. The following size of the platform means use of a core tablet with elongated flake (blady?) proportions for possible rejuvenation. Platform negatives' maximum length: the same as the core's length, 5.1 cm. Reason for core abandonment: no obvious reason.

Level Fa1-Fa2

A single core-like piece here is a Flake/Bladelet Multiplatform core (fig. 2:3). It has numerous heavily hinged flake and bladelet negatives removed non-systematically from four striking platforms on the core's two flaking surfaces. The following flaking features are clearly connected to the extreme exhaustion of the core after many attempts at regular, probably bladelet, reduction. It is on gray flint and is a nodule/chunk, 3.6 cm long, 3.0 cm wide and 2.2 cm thick.

Core-like pieces of Unit F can be generally and briefly characterized as follows. By debitage category production, cores are set apart by the complete absence of blade cores and, moreover, there is only a single blade/bladelet core among the 16 morphologically identifiable cores. On the other hand, the rest of the cores are represented by either cores with only bladelet removals (12 items) or flake/bladelet multiplatform exhausted cores (4 items) where the latter are interpreted as being multiply reshaped and reduced bladelet cores. Also, bladelet *sensu stricto* cores are notable for the presence of a series of narrow flaked items/"carinated burins" which differ from carinated burins by a wider flaking removal surface. At the same time, the presence of these specific cores once again underlines that carinated burins not an occasional occurrence among the tools, as will be shown below in the tool descriptions. Finally, the emphasis on bladelet production for cores is again in accordance with the presence of both carinated end-scrapers and burins, which are also objects for bladelet production, and non-geometric microliths within the tool samples of Unit F levels.

Core Maintenance Products (CMP)

This artifact category is well-represented in level Fb1-Fb2, while other three levels have fewer core maintenance products, although percentages are relative to the overall assemblage size of these levels. Taking core maintenance products from all four levels together, we have a sizeable sample of 205 the following items for the Unit F artifact assemblage (see tabl. 3A).

Level Fc

There are only 5 core maintenance products: 4 crested pieces and 1 core trimming element which are all on gray flints, including one burnt crested blade.

Crested Pieces. These include 2 crested flakes (50%) and 2 crested blades (50%).

Crested Flakes. There are a primary and a re-crested pieces with preserved crested ridge.

The primary piece is a complete (length: 2.5 cm, width: 1.4 cm, thickness: 0.3 cm) non-cortical one with unilateral wholly crest-

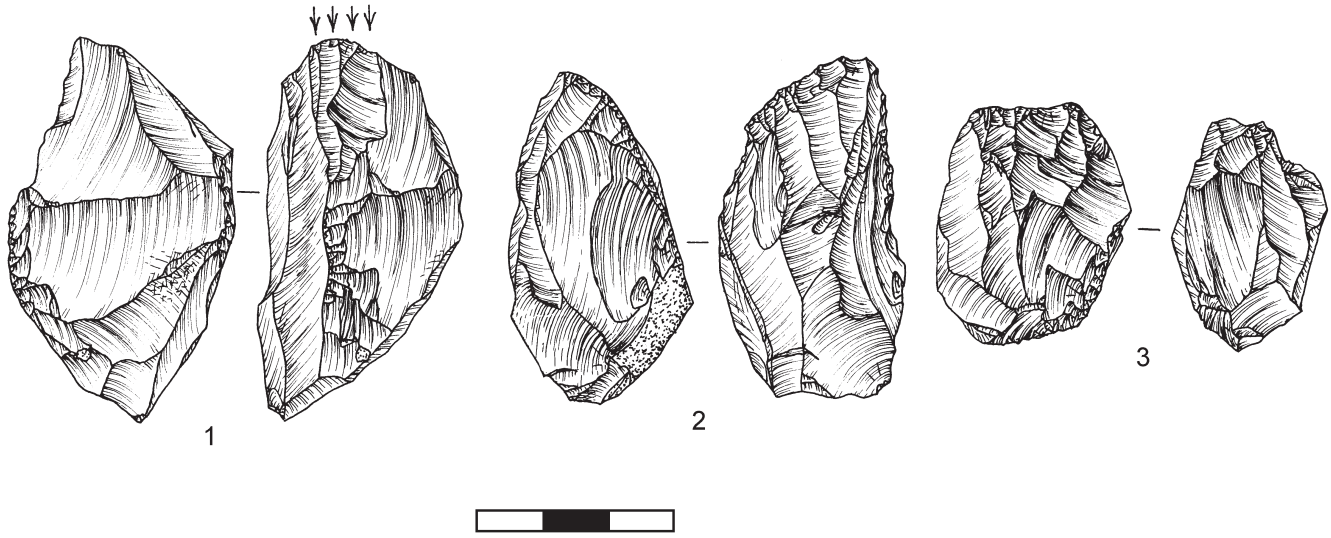

Figure 2 - Siuren I. Unit F, levels Fa3 and Fa1-Fa2. Flint Artifacts – Cores. 1, bladelet pre-core/carinated burin (level Fa3); 2, "carinated" single-platform sub-cylindrical bladelet core (level Fa3); 3, multiplatform flake/bladelet core (level Fa1-Fa2).

	Level Fc	Level Fb1-Fb2	Level Fa3	Level Fa1-Fa2	TOTAL
CRESTED PIECES	*4*	*126*	*19*	*9*	**158 / 77.1%**
- Crested Flakes	2	23	1	1	
- Crested Blades	2	28	9	4	
- Crested Bladelets		39	6	4	
- Crested Microblades		36	3		
CORE TABLETS	*0*	*24*	*9*	*2*	**35 / 17.1%**
- on Flakes		12	7		
- on Blades		11	2	2	
- on Bladelets		1			
CORE TRIMMING ELEMENTS	*1*	*7*	*2*	*2*	**12 / 5.8%**
TOTAL	**5 / 2.4%**	**157 / 76.7%**	**30 / 14.6%**	**13 / 6.3%**	**205 / 100.0%**

Table 3A - Siuren-I. Unit F. Core Maintenance Products Structure.

ed preparation and lateral steep profile at midpoint. Morphological features: dorsal-plain scar pattern, converging shape, "on-axis" removal direction, twisted general profile, feathering distal end and plain (0.2 x 0.2 cm) butt (semi-lipped, right angle, with no abrasion).

The re-crested piece is a complete (length – 2.8 cm, width – 1.9 cm, thickness – 0.5 cm) partially cortical one (non-significant proximal cortex) with bilateral partial crested preparation and lateral steep profile at midpoint. Morphology: unidirectional-crossed scar pattern, converging shape, "on-axis" removal direction, incurvate medial general profile, feathering distal end and crushed butt.

The Crested Blades are both primary pieces with preserved crested ridge. They are non-cortical broken items: proximal and medial fragments of similar size: length – 2.3 cm for both, width – 1.4 cm and 1.5 cm, thickness – 0.8 cm for both. Their recognizable morphological features are limited to dorsal-plain scar patterns and 1 crushed and 1 missing butts.

Core Trimming Element. The Core Trimming Element is a complete non-cortical flake with transversal placement of bilateral partial crested preparation. It has a small plain (0.2 x 0.2 cm) butt (semi-lipped, right angle, with abrasion), 2.5 cm long, 1.3 cm wide and 0.4 cm thick.

Level Fb1-Fb2

The sample of this artifact category (157 pieces) is the largest one of all levels in Unit F. It is subdivided into crested pieces (126 items), core tablets (24 items) and core trimming elements (7 items).

Crested Pieces. These include crested flakes (23 pieces/18.2%), crested blades (28 pieces/22.2%), crested bladelets (39 pieces/31.0%) and crested microblades (36 pieces/28.6%).

Crested Flakes. These include 5 primary, 8 re-crested, 5 secondary pieces and 1 unidentifiable piece with preserved crested ridge, and 4 truly secondary pieces with no preserved crested ridge. All but one unidentifiable (brown flint) crested flakes were made on gray flints.

Five primary crested flakes are complete 3 of which are non-cortical and 2 partially cortical with insignificant proximal (1) and central (1) cortex with the following characteristics of crested ridges: unilateral (4)/bilateral (1) and wholly (2)/par-

tially (3) crested preparation with 1 triangular and 4 lateral steep profiles at midpoint. Morphology: 2 dorsal-plain, 1 crested, 1 unidirectional-crossed and 1 unidentifiable scar patterns; 2 expanding, 1 ovoid and 2 irregular shapes; 1 "on-axis" and 4 "off-axis" removal directions; 1 flat, 1 incurvate distal and 3 twisted general profiles; 4 feathering and 1 unidentifiable distal ends; 2 plain (2.8-0.5 x 1.6-0.2 cm) butts (2 semi-lipped, 1 right and 1 semi-acute angles, 2 with no abrasion), 1 punctiform butt (semi-lipped, semi-acute angle, with no abrasion) and 2 crushed butts. They have the following dimension ranges: length – 1.8-5.1 cm, width – 1.1-3.6 cm and thickness – 0.3-2.1 cm.

Eight re-crested flakes are complete non-cortical ones with the following crested ridge characteristics: unilateral (7)/bilateral (1) and wholly (1)/partially (7) crested preparation with 2 triangular and 6 lateral steep profiles at midpoint. Morphologically, they have 4 unidirectional and 4 unidirectional-crossed scar patterns; 1 parallel, 1 converging, 4 expanding and 2 irregular shapes; 2 "on-axis" and 6 "off-axis" removal directions; 1 flat, 1 incurvate medial, 2 incurvate distal and 4 twisted general profiles; 3 feathering, 1 hinged, 2 blunt and 2 unidentifiable distal ends; 3 plain (1.1 – 0.8 – 0.4 x 0.4 – 0.3 – 0.2 cm) butts (2 semi-lipped and 1 not lipped, 1 right and 2 semi-acute angles, 2 with abrasion and 1 with no abrasion), 1 linear (0.3 x 0.1 cm) butt (semi-lipped, semi-acute angle, with no abrasion), 2 dihedral (1.6-0.8 x 0.5-0.3 cm) butts (semi-lipped, semi-acute angles, with abrasion) and 2 crushed butts. Metrically, they are in the following ranges: length – 1.0-4.7 cm, width – 0.9-3.6 cm (2 with shortened, transversal proportions), thickness – 0.2-1.7 cm.

Five secondary pieces with preserved crested ridge are complete non-cortical ones with the following characteristics of crested ridges: all 5 unilateral partial, and 2 triangular and 3 lateral steep profiles at midpoint. Morphological features: 4 unidirectional and 1 bidirectional scar patterns; 3 converging and 2 expanding shapes; 5 "off-axis" removal directions; 1 convex and 4 twisted general profiles; 2 feathering, 2 hinged and 1 unidentifiable distal ends; 3 punctiform butts with abrasion, 1 linear (0.5 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion) and 1 crudely-faceted (1.2 x 1.2 cm) butt (semi-lipped, semi-acute angle, with no abrasion). Metric ranges: length – 1.9-3.1 cm, width – 1.1-2.1 cm and thickness – 0.4-1.4 cm.

An unidentifiable piece is complete and non-cortical with unilateral wholly crested preparation and lateral steep profile at midpoint. It has unidentifiable scar pattern (the main reason for the piece's attribution as an unidentifiable crested flake), irregular shape, "off-axis" removal direction, flat general profile, feathering distal end and crushed butt. It is 1.9 cm long, 1.2 cm wide and 0.4 cm thick.

Four truly secondary pieces with no preserved crested ridge include 4 complete of which 2 are non-cortical (insignificant lateral (1) and distal (1) cortex) ones with the following morphological features: 1 lateral, 2 unidirectional-crossed and 1 bidirectional scar patterns; 2 expanding, 1 ovoid and 1 irregular shapes; 4 "off-axis" removal directions; 2 incurvate medial, 1 incurvate distal and 1 twisted general profiles; 1 feathering, 1 overpassed and 2 unidentifiable distal ends; 1 triangular and 3 irregular profiles at midpoint; 1 plain (0.2 x 0.2 cm) butt (semi-lipped, semi-acute angle, with no abrasion), 1 dihedral (1.3 x 0.7 cm) butt (semi-lipped, semi-acute angle, with no abrasion) and 2 crushed butts. Dimension ranges: length – 1.9-5.1 cm, width – 1.7-3.8 cm (1 with shortened, transversal proportions) and thickness – 0.6-1.7 cm.

Crested Blades. There are 4 primary, 7 re-crested, 11 secondary and 4 unidentifiable pieces with preserved crested ridge and 2 truly secondary pieces with no preserved crested ridge. Aside from two pieces on brown flints, all other 26 crested blades are made on gray flints.

Four primary pieces are all complete, of which 2 are non-cortical and 2 partially cortical (with insignificant distal (1) and central + distal (1) cortex) ones with unilateral (2)/bilateral (2) and wholly (4) crested preparation. Morphologically, they have 1 cortical, 1 dorsal-plain and 2 crested scar patterns; 1 converging and 3 irregular shapes; 2 "on-axis" and 2 "off-axis" removal directions; 2 incurvate medial and 2 twisted general profiles; 1 feathering, 2 blunt and 1 unidentifiable distal ends; 1 plain (0.6 x 0.3 cm) butt (not lipped, right angle, with no abrasion), 1 crudely-faceted (0.9 x 0.6 cm) butt (semi-lipped, right angle, with no abrasion), 1 finely-faceted (0.9 x 0.6 cm) butt (semi-lipped, semi-acute angle, with no abrasion) and 1 crushed butt. Metrically, they have two different sizes: for 2 pieces – length – 3.9 and 3.1 cm, width – 1.4 and 1.5 cm, thickness – 1.1 – 0.8 cm, and for 2 more pieces – length – 12.2 and 12.1 cm, width – 2.7 and 2.6 cm, thickness – 1.9 and 1.8 cm.

Seven re-crested pieces have the following characteristics of crested ridges: 7 unilateral wholly (2)/partially (5) crested preparation and 7 lateral steep profiles at midpoint. Morphologically, they have the following features: 3 complete, 2 proximal and 2 distal fragments; 5 unidirectional and 2 unidentifiable scar patterns, 3 parallel, 1 converging, 1 expanding and 2 unidentifiable shapes; 3 "on-axis", 1 "off-axis" and 3 unidentifiable removal directions; 5 twisted and 2 unidentifiable general profiles; 4 feathering, 1 blunt and 2 unidentifiable distal ends; 1 plain (0.4 x 0.2 cm) butt (semi-lipped, right angle, with no abrasion), 1 linear (0.3 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion), 1 dihedral (1.5 x 0.3 cm) butt (semi-lipped, right angle, with abrasion), 2 crushed and 2 missing butts. They have the following dimensions ranges: length – 2.6-5.2 cm for three complete items and 1.9-3.2 cm for four broken items, width – 1.2-1.7 cm, thickness – 0.3-0.9 cm.

Eleven secondary pieces have the following characteristics of crested ridges: unilateral (10)/bilateral (1) and 11 partially crested preparation with 7 triangular and 4 lateral steep profiles at midpoint. Morphology: 7 complete, 1 proximal and 3 distal parts; 8 unidirectional, 1 unidirectional-crossed and 2 bidirectional scar patterns; 1 parallel, 5 converging, 2 expanding, 2 irregular and 1 unidentifiable shapes; 1 "on-axis", 7 "off-axis" and 3 unidentifiable removal directions; 1 flat, 2 incurvate medial, 7 twisted and 1 unidentifiable general profiles; 8 feathering, 2 blunt and 1 unidentifiable distal ends; 1 cortical (2.0 x 0.7 cm) butt (semi-lipped, semi-acute angle, with no abrasion), 3 plain (0.9 – 0.7 – 0.4 x 0.4 – 0.2 cm) butts (3 semi-lipped, 1 right and 2 semi-acute angles, 2 with abrasion and 1 with no abrasion), 2 punctiform (1 with abrasion and 1 with no abrasion) butts, 1

linear (0.6 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion), 1 finely-faceted (0.4 x 0.3 cm) butt (semi-lipped, right angle, with no abrasion) and 3 missing butts. They have the following metric ranges: length – 3.2-6.4 cm for 7 complete items and 2.2-4.0 cm for 4 broken items, width – 1.2-1.5 cm for 7 pieces, 1.6 cm for 1 piece and 2.2-2.7 cm for 3 pieces, thickness – 0.4-1.1 cm for all 11 pieces.

Four unidentifiable pieces have unilateral partially crested preparation and 3 triangular and 1 lateral steep profiles at midpoint. They include one complete partially cortical piece with insignificant lateral cortex and 3 broken non-cortical pieces – 1 medial and 2 distal fragments. All have unidentifiable scar patterns, as well as other unclear morphological features. The complete item has a plain (0.7 x 0.3 cm) butt (semi-lipped, semi-acute angle, with abrasion) and is 4.4 cm long, 2.1 cm wide and 0.7 cm thick. Three broken specimens are 2.5-4.7 cm long, 1.2-1.3 cm and 2.7 cm wide, 0.7-0.9 cm and 1.2 cm thick.

Two truly secondary pieces with no preserved crested ridge include 1 proximal and 1 distal partially cortical items with insignificant lateral cortex. Their other morphological features are as follows: 1 unidirectional and 1 bidirectional scar patterns; 1 irregular and 1 unidentifiable shapes; 1 "off-axis" and 1 unidentifiable removal directions; 1 twisted and 1 unidentifiable general profiles; 1 blunt and 1 unidentifiable distal ends; 1 trapezoidal and 1 multifaceted profiles at midpoint; 1 plain (semi-lipped, semi-acute angle, with no abrasion) butt and 1 missing butt. Their sizes as follows: length – 4.2 and 2.2 cm, width – 1.8 and 2.3 cm, thickness – 0.9 cm for both.

Crested Bladelets. There are 12 primary, 3 re-crested, 14 secondary and 4 unidentifiable pieces with preserved crested ridge, and 6 truly secondary pieces with no preserved crested ridge. Aside from 1 piece on colored burnt flint, the other 38 crested bladelets are on gray flints, including 5 of them burnt.

Twelve primary pieces have the following characteristics of crested ridges: unilateral (11)/bilateral (1) and wholly (10)/partially (2) crested preparation with 11 triangular and 1 lateral steep profiles at midpoint. Morphologically, they have the following features: 7 complete, 3 proximal and 2 distal fragments; 9 dorsal-plain, 1 unidirectional, 1 crested and 1 unidentifiable scar patterns; 2 parallel, 5 converging, 2 expanding, 1 irregular and 2 unidentifiable shapes; 3 "on-axis", 7 "off-axis" and 2 unidentifiable axis of removal directions; 1 flat, 2 incurvate medial, 1 incurvate distal, 7 twisted and 1 unidentifiable general profiles; 9 feathering, 1 blunt and 2 unidentifiable distal ends; 9 non-cortical, 2 partially cortical pieces with significant lateral (1) and proximal (1) cortex and 1 partially cortical piece with insignificant lateral cortex; 1 plain (0.8 x 0.3 cm) butt (semi-lipped, semi-acute angle, with no abrasion), 3 punctiform butts (2 semi-lipped and 1 unidentifiable, 2 semi-acute and 1 unidentifiable angles, 3 with no abrasion), 1 dihedral (0.5 x 0.2 cm) butt (semi-lipped, semi-acute angle, with no abrasion), 5 crushed and 2 missing butts. They have the following dimension ranges: length – 1.7-4.6 cm for 7 complete items and 1.2-4.0 cm for 5 broken items; width – 0.7-0.9 cm for 8 items and 1.0-1.1 cm for 4 items; thickness – 0.3-0.8 cm.

Three re-crested pieces have unilateral partial crested preparation with 1 triangular and 2 lateral steep profiles at midpoint. They are 3 complete, 2 non-cortical and 1 partially cortical, pieces with insignificant lateral cortex and the following morphological features: 3 unidirectional scar patterns, 2 converging and 1 expanding shapes; 1 "on-axis" and 2 "off-axis" removal directions; 2 incurvate medial and 1 incurvate distal general profiles; 3 feathering distal ends; 1 punctiform butts with abrasion and 2 crushed butts. They have the following metric ranges: length – 1.7-2.5 cm, width – 0.8 for 2 items and 1.1 cm for 1 item; thickness – 0.3-0.7 cm.

Fourteen secondary pieces have the following crested ridge characteristics: all 14 unilateral partially with 7 triangular and 7 lateral steep profiles at midpoint. Morphologically, they have the following features: 11 complete, 1 proximal and 2 distal fragments; 14 unidirectional scar patterns; 8 converging, 1 expanding, 4 irregular and 1 unidentifiable shapes; 5 "on-axis", 8 "off-axis" and 1 unidentifiable removal directions; 1 flat, 3 incurvate medial and 10 twisted general profiles; 9 feathering, 1 overpassed, 2 blunt and 2 unidentifiable distal ends; 9 non-cortical and 5 partially cortical pieces with insignificant proximal (1), distal (1) and lateral (3) cortex; 1 cortical (0.6 x 0.3 cm) butt (semi-lipped, semi-acute angle, with no abrasion), 5 puctiform butts (2 semi-lipped and 3 unidentifiable, 2 semi-acute and 3 unidentifiable angles; 2 with abrasion and 2 with no abrasion), 4 linear (0.3 x 0.1 cm) butts (4 semi-lipped, 4 semi-acute angles, 4 with abrasion), 1 crudely-faceted (0.6 x 0.4 cm) butt (semi-lipped, semi-acute angle, with no abrasion), 1 crushed and 2 missing butts. Metrically, they are as follows: length – 1.6 – 3.7 cm for 11 complete items and 1.4 – 2.8 cm for 3 broken items; width – 0.7 – 0.9 cm – 9 items and 1.0 – 1.1 cm for 5 items; thickness – 0.2 – 0.7 cm.

Four unidentifiable pieces have 4 unilateral 1 wholly and 3 partially crested preparation with 3 triangular and 1 lateral steep profiles at midpoint. They are 1 medial and 3 distal fragments – 3 non-cortical and 1 partially cortical pieces with insignificant lateral cortex. Their morphology is as follows: 1 dorsal-plain and 3 unidentifiable scar patterns; 2 converging, 1 irregular and 1 unidentifiable shapes; 1 "off-axis" and 3 unidentifiable removal directions; 1 twisted and 3 unidentifiable general profiles; 3 feathering and 1 unidentifiable distal ends; 4 missing butts. Their size ranges are the following ones: length – 1.2 – 2.2 cm; width – 0.9 for 2 items and 1.0 – 1.1 cm for 2 items; thickness – 0.4 – 0.5 cm.

Six truly secondary pieces with no preserved crested ridges are 4 complete items and 2 proximal fragments which are 5 non-cortical and 1 partially cortical pieces with insignificant lateral cortex. Morphologically, they have 6 unidirectional scar patterns; 3 converging, 1 irregular and 2 unidentifiable shapes; 1 "on-axis", 3 "off-axis" and 2 unidentifiable removal directions; 2 incurvate medial and 4 twisted general profiles; 4 feathering and 2 unidentifiable distal ends; 1 triangular and 5 trapezoidal profiles at midpoint; 5 linear (0.4-0.2 x 0.1 cm) butts (5 semi-lipped, 1 right and 4 semi-acute angles, 5 with abrasion) and 1 punctiform butt with abrasion. Their dimension ranges are as follows: length – 2.7 – 3.7 cm for 4 complete items and 2.4 – 2.6 cm for 2 broken items; width – 0.7 – 0.9 cm for 5 items and 1.1 cm for one more item; thickness – 0.2 – 0.5 cm.

Crested Microblades. There are 20 primary, 6 re-crested, 5 secondary and 3 unidentifiable pieces with preserved crested ridge, and 2 truly secondary pieces with no preserved crested ridge. All of them are on gray flints.

Twenty primary pieces have the following crested ridge characteristics: unilateral (18)/bilateral (2) and wholly (18)/partially (2) crested preparation with 10 triangular and 10 lateral steep profiles at midpoint. Morphologically, they are as follows: 11 complete pieces, 1 proximal, 2 medial and 6 distal fragments; 16 dorsal-plain, 1 unidirectional, 2 crested and 1 unidentifiable scar patterns; 13 converging, 3 expanding, 1 irregular and 3 unidentifiable shapes; 3 "on-axis", 14 "off-axis" and 3 unidentifiable removal directions; 2 flat, 3 incurvate medial, 1 incurvate distal and 14 twisted general profiles; 14 feathering, 2 hinged and 4 unidentifiable distal ends; 1 cortical (0.4 x 0.2 cm) butt (semi-lipped, semi-acute angle, with no abrasion), 1 plain (0.2 x 0.2 cm) butt (semi-lipped, semi-acute angle, with no abrasion), 7 punctiform butts with no abrasion, 3 crushed and 8 missing butts. Metrically, they are in the following ranges: length – <= 1.5 cm – 5 complete items and > 1.5 cm (1.6-2.6 cm) – 6 complete items, 0.7-3.0 cm for 9 broken items; width – 0.5-0.6 cm – 10 items and 0.2-0.4 cm – 10 items; thickness – 0.1-0.6 cm.

Six re-crested pieces have the following characteristics of crested ridges: 6 unilateral and wholly (3)/partially (3) crested preparation with 2 triangular and 4 lateral steep profiles at midpoint. Morphology: 4 complete pieces and 2 proximal fragments; 6 unidirectional scar patterns; 1 parallel, 3 converging and 2 unidentifiable shapes; 2 "on-axis", 2 "off-axis" and 2 unidentifiable removal directions; 1 flat, 1 incurvate medial and 4 twisted general profiles; 2 feathering, 1 hinged and 3 unidentifiable distal ends; 1 plain (0.2 x 0.2 cm) butt (semi-lipped, semi-acute angle, with abrasion), 2 punctiform butts (semi-lipped, semi-acute angles, with abrasion), 1 linear (0.4 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion) and 2 crushed butts. Their size ranges are as follows: length – 1.0-2.4 cm for 4 complete items and 1.2-2.0 cm for 2 broken items; width – 0.5 cm for 2 items and 0.3-0.4 cm for 4 items; thickness – 0.2-0.3 cm.

Five secondary pieces have the following crested ridge characteristics: 5 unilateral partially with 3 triangular and 2 lateral steep profiles at midpoint. They include 2 complete pieces and 1 proximal, 1 medial and 1 distal fragments; all are non-cortical. Morphologically, they have 5 unidirectional scar patterns; 1 parallel, 2 converging and 2 unidentifiable shapes; 1 "on-axis", 2 "off-axis" and 2 unidentifiable removal directions; 1 flat, 1 incurvate medial and 3 twisted general profiles; 2 feathering, 1 hinged and 2 unidentifiable distal ends; 2 linear (0.3-0.2 x 0.1 cm) butts (semi-lipped, semi-acute angles, with abrasion), 1 crushed and 2 missing butts. Metrically, they have the following ranges: length – 1.9 and 2.0 cm for 2 complete items and 1.0-1.9 cm for 3 broken items; width – 0.5-0.6 cm for 3 items and 0.4 cm for 2 items; thickness – 0.2-0.5 cm.

Three unidentifiable pieces have 3 unilateral and 2 wholly/1 partially crested preparation with 1 triangular and 2 lateral steep profiles at midpoint. They include 2 distal non-cortical fragments and 1 medial partially cortical fragment with insignificant central cortex. They have the following morphological features: 3 unidentifiable scar patterns; 1 parallel and 2 unidentifiable shapes; 1 "on-axis" and 2 unidentifiable removal directions; 1 overpassed and 2 unidentifiable distal ends, and 3 missing butts. Their metric ranges are as follows: length – 1.2-1.5 cm, width – 0.3 – 0.4 – 0.5 cm and thickness – 0.3 cm.

Two truly secondary pieces with no preserved crested ridges are non-cortical: 1 complete item and 1 proximal fragment. Morphological features: 1 dorsal-plain and 1 unidentifiable scar patterns; 1 converging and 1 unidentifiable shapes; 1 "on-axis" and 1 unidentifiable removal directions; 2 twisted general profiles; 1 feathering and 1 unidentifiable distal ends; 2 lateral steep profiles at midpoint; 1 linear (0.4 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion) and 1 crushed butt. They are 1.6 cm long for complete piece and 1.4 cm long for broken item; 0.5 and 0.3 cm wide; 0.3 and 0.2 cm thick.

Core Tablets. There are 12 primary core tablets on flakes, 10 primary core tablets on blades, 1 secondary core tablet on blade (refitted to one primary core tablet on blade) and 1 primary core tablet on bladelet. All 24 are made on gray flints.

Twelve primary core tablets on flakes (9 complete pieces and 3 proximal fragments) include 8 non-cortical pieces, 3 partially cortical pieces with insignificant proximal (1), distal (1) and distal + lateral (1) cortex, and 1 partially cortical piece with significant distal + lateral cortex. Nine primary core tablets on flakes have remnants of cores striking platform in the butt area only. On the other hand, 2 other pieces have remnants of cores striking platform either in the butt area and one lateral edge (1 item) or in the butt area and two lateral edges (1 item). The final piece has in the butt area in the butt area and one lateral edge and additionally has a crested preparation on its dorsal surface. Thus, this piece is also a re-crested flake with unilateral partial crested preparation and lateral steep profile at midpoint. The dimensions of these primary core tablets on flakes are in the following ranges: length – 1.4-5.9 cm and width – 1.4-3.3 cm (1 with shortened, transversal proportions), thickness – 0.3-1.1 cm for 9 complete items; length – 1.9-3.5 cm, width – 1.7-2.9 cm and thickness – 0.4-0.5 cm for 3 broken items.

Ten primary core tablets on blades (5 complete pieces and 5 proximal fragments) include 6 non-cortical pieces, 3 partially cortical pieces with insignificant proximal (1), distal (1) and distal + lateral (1) cortex, and 1 wholly cortical item. Seven primary core tablets on blades have the following locations remnants of core striking platforms: in the butt area – 1 piece (refitted onto a secondary core tablet on blade), in the butt area and 1 lateral edge – 4 pieces, and in the butt area and 2 lateral edges – 2 pieces. Three additional primary core tablets on blades have remnants of core striking platforms in the butt area only and crested preparation on their dorsal surfaces as well. All three pieces are secondary crested items with preserved crested ridges which are all unilateral partial with lateral steep profiles at midpoint. Metrically, 10 primary core tablets on blades are in the following ranges: length – 4.9-6.2 cm, width – 1.4-2.7 cm, thickness – 0.3-1.9 cm for 5 complete items and length – 1.7-4.6 cm, width – 1.3-1.9 cm, thickness – 0.4-0.7 cm for 5 broken items.

A secondary core tablet on blade, to which the primary core tablet on blade was refitted, is a non-cortical proximal fragment with core striking platform remains in the butt area. It is 1.8 cm long, 1.7 cm wide and 0.3 cm thick.

A primary core tablet on bladelet is a complete non-cortical one with its core striking platform remains on the butt area. It is 4.7 cm long, 1.0 cm wide and 0.5 cm thick.

Core Trimming Elements. Core Trimming Elements include 6 complete flakes and 1 longitudinally fragmented distal part of a flake – 4 non-cortical, 2 partially cortical with insignificant distal (1) and lateral (1) cortex and 1 partially cortical with significant central cortex. All have transverse location of 6 unilateral partial and 1 bilateral wholly crested ridges. Six complete pieces have the following dimension ranges: length – 1.5-3.6 cm, width – 1.3-2.9 cm (2 with shortened, transversal proportions), thickness – 0.5-0.9 cm. The broken item is 4.3 cm long, 2.3 cm wide and 0.6 cm thick. All 7 pieces are on gray flints.

Level Fa3

This artifact category is represented by 30 specimens subdivided into crested pieces (19 items), core tablets (9 items) and core trimming elements (2 items). All core maintenance products are made on gray flints.

Crested Pieces. They include crested flakes (1 piece/5.3%), crested blades (9 pieces/47.3%), crested bladelets (6 pieces/31.6%) and crested microblades (3 pieces/15.8%).

Crested Flake is a complete partially cortical (insignificant lateral cortex) secondary item with unilateral partial crested preparation and triangular profile at midpoint. Other morphological features: unidirectional scar pattern, converging shape, "off-axis" removal direction, incurvate medial general profile, blunt distal end and dihedral (3.2 x 0.6 cm) butt (semi-lipped, semi-acute angle, with abrasion). It is 4.9 cm long, 3.5 cm wide and 0.9 cm thick.

Crested Blades. There are 5 re-crested, 3 secondary pieces with preserved crested ridge and 1 truly secondary with no preserved crested ridge.

Five re-crested pieces have the following characteristics of crested ridges: 5 unilateral and wholly (1)/partially (4) crested preparation with 3 triangular and 2 lateral steep profiles at midpoint. Morphological features: 3 complete pieces and 2 distal parts; 4 unidirectional and 1 bidirectional scar patterns; 1 converging, 3 expanding and 1 irregular shapes; 4 "off-axis" and 1 unidentifiable axis of removal directions; 4 incurvate medial and 1 unidentifiable general profiles; 5 feathering distal ends; 4 non-cortical and 1 partially cortical with insignificant lateral cortex; 3 plain (0.6-0.6-0.3 x 0.2 cm) butts (3 semi-lipped, 1 semi-acute and 2 acute angles; 2 with abrasion and 1 with no abrasion) and 2 missing butts. Three complete items have the following dimensions: length – 4.5 – 3.7 – 3.3 cm, width – 1.7 – 1.3 – 1.6 cm and thickness – 0.9 – 0.7 – 0.6 cm. Two distal fragments are 4.2 and 1.9 cm long, 2.6 and 1.2 cm wide, 0.6 and 0.4 cm thick.

Three secondary pieces have the following crested ridge characteristics: unilateral partially crested preparation only with 1 triangular and 2 lateral steep profiles at midpoint. Morphological features: 2 complete pieces and 1 proximal part; 2 unidirectional and 1 unidentifiable scar patterns; 1 converging, 1 expanding and 1 irregular shapes; 3 "off-axis" removal directions; 2 twisted and 1 incurvate medial general profiles; 1 feathering, 1 blunt and 1 unidentifiable distal ends; 2 non-cortical pieces and 1 partially cortical piece with insignificant distal cortex; 1 linear (0.3 x 0.1 cm) butt with abrasion and 2 crushed butts. Two complete pieces have the following metrics: length – 5.6 and 4.1 cm, width – 1.4 and 1.6 cm, thickness – 1.4 and 0.8 cm. The proximal piece is 2.1 cm long, 1.2 cm wide and 0.3 cm thick.

A truly secondary piece with no preserved crested ridge is a non-cortical medial fragment (length – 3.7 cm, width – 1.5 cm, thickness – 0.3 cm) with unidirectional scar pattern, incurvate medial general profile and trapezoidal profile at midpoint.

Crested Bladelets. These include 1 primary, 3 re-crested and 2 truly secondary pieces with no preserved crested ridge.

The primary piece is a complete non-cortical one with unilateral crested preparation and triangular profile at midpoint. It has dorsal-plain scar pattern, irregular shape, "off-axis" removal direction, twisted general profile, feathering distal end and cortical (0.7 x 0.5 cm) butt (semi-lipped, semi-acute angle, with no abrasion). It is 4.5 cm long, 1.0 cm wide and 0.7 cm thick.

Three re-crested pieces have 3 unilateral and 2 wholly/1 partially crested ridges with 1 triangular and 2 lateral steep profiles at midpoint. Morphology: 1 complete piece and 2 distal parts; 3 unidirectional scar patterns; 2 converging and 1 irregular shapes; 3 "off-axis" removal directions; 3 twisted general profiles; 2 feathering and 1 hinged distal ends; 3 non-cortical items; 1 linear (0.3 x 0.1 cm) butt with abrasion and 2 missing butts. The complete piece is 2.1 cm long, 0.8 cm wide and 0.3 cm thick. Two distal fragments have the following dimensions: length – 2.2 and 3.2 cm, width – 0.8 and 1.1 cm, thickness – 0.4 and 0.3 cm.

Two truly secondary pieces have the following morphological features: 2 complete non-cortical items; 2 unidirectional scar patterns; 2 expanding shapes; 1 "on-axis" and 1 "off-axis" removal directions; 1 incurvate medial and 1 twisted general profiles; 2 feathering distal ends; 1 triangular and 1 trapezoidal profiles at midpoint; 2 small plain (0.4-0.3 x 0.3-0.2 cm) butts (2 semi-lipped, 2 semi-acute angles, 1 with abrasion and 1 with no abrasion). Their sizes are as follows: length – 2.8 and 2.1 cm, width – 0.8 and 1.0 cm, thickness – 0.2 and 0.5 cm.

Crested Microblades are represented by 3 primary complete non-cortical pieces. They include 3 unilateral and 1 wholly/2 partially crested preparation with 2 triangular and 1 lateral steep profiles at midpoint. Morphologically, they are characterized by 3 dorsal-plain scar patterns; 2 converging and 1 expanding shapes; 3 "off-axis" removal directions; 1 incurvate medial, 1 incurvate distal and 1 twisted general profiles; 2 feathering and 1 unidentifiable distal ends; 1 plain (0.3 x 0.2 cm) butt (semi-

lipped, semi-acute angle, with abrasion), 1 punctiform butt (semi-lipped, semi-acute angle, with no abrasion) and 1 crushed butt. Metrically, they are 3.0 – 2.1 – 1.1 cm long, 0.6 – 0.6 – 0.5 cm wide and 0.4 – 0.3 – 0.4 cm thick.

Core Tablets. There are 7 primary core tablets on flakes and 2 primary core tablets on blades.

First, core tablets on flakes will be described. There are 3 non-cortical items, 3 partially cortical items with insignificant lateral cortex and 1 partially cortical item with significant proximal + lateral cortex. These 7 core tablets have the following location of remnants of core striking platforms: in the butt area for 3 pieces, in the butt area and 1 lateral edge for 2 pieces, and in the butt area and 2 lateral edges for 2 more pieces. They have the following metric ranges: length – 1.6 – 6.0 cm, width – 1.4 – 4.5 cm and thickness – 0.2 – 1.2 cm.

Two core tablets on blades are unusual complete non-cortical items, as they have, at the same time, crested preparation traces on their dorsal surfaces as well. Accordingly, one piece is additionally a secondary crested blade with unilateral partial crested preparation and lateral steep profile at midpoint, while another piece is a truly secondary crested blade with no preserved crested ridge. Both pieces have cores' striking platform remains on their butts' areas. Metrically, they are 5.7 and 5.4 cm long, 1.5 and 2.3 cm wide, 1.3 and 1.4 cm thick.

Core Trimming Elements. Core Trimming Elements include 2 broken (distal parts) non-cortical flakes with transversal location of unilateral partial crested ridge. They have the following dimensions: length – 2.1 and 1.3 cm, width – 3.1 and 1.0 cm, thickness – 0.7 and o.5 cm.

Level Fa1-Fa2

This artifact category is represented by 13 specimens – 9 crested pieces, 2 core tablets and 2 core trimming elements. All items are on gray flints.

Crested Pieces. These include 1 crested flake (11.1%), 4 crested blades (44.4%) and 4 crested bladelets (44.4%).

The Crested Flake is a re-crested complete non-cortical one with unilateral wholly crested preparation and lateral steep profile at midpoint. Morphological features: unidirectional scar pattern, expanding shape, "off-axis" removal direction, incurvate medial general profile, feathering distal end and linear (0.3 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion). It is 1.7 cm long, 1.0 cm wide and 0.3 cm thick.

Crested Blades. These include 1 re-crested item, 2 secondary pieces with preserved crested ridge and 1 truly secondary item with no preserved crested ridge.

The re-crested blade is a non-cortical proximal part (2.2 cm long, 1.3 cm wide and 0.3 cm thick) with unilateral wholly crested preparation and lateral steep profile at midpoint. Morphologically, it has identifiable unidirectional scar pattern, twisted general profile and crushed butt with abrasion.

Two secondary crested blades are complete non-cortical items with bilateral partial crested preparation and triangular profile at midpoint. Morphologically, they have 2 unidirectional scar patterns; 1 expanding and 1 irregular shapes; 2 "off-axis" removal directions; 2 incurvate medial general profiles; 1 feathering and 1 unidentifiable distal ends; 1 plain (0.4 x 0.2 cm) butt (semi-lipped, semi-acute angle, with no abrasion) and 1 crushed butt. Their dimensions are as follows: length – 4.3 and 3.2 cm, width – 1.5 and 1.4 cm, thickness – 0.8 for both.

The truly secondary crested blade with no preserved crested ridge is a complete non-cortical piece with unidirectional scar pattern, parallel shape, "on-axis" removal direction, incurvate medial general profile, feathering distal end, irregular profile at midpoint and plain (0.6 x 0.3 cm) butt (semi-lipped, semi-acute angle, with no abrasion). It is 3.6 cm long, 1.4 cm wide and 0.7 cm thick.

Crested Bladelets are represented by 1 primary, 1 re-crested and 2 secondary pieces with preserved crested ridge.

The primary crested bladelet is a complete non-cortical item with unilateral wholly crested preparation and lateral steep profile at midpoint. Morphology: dorsal-plain scar pattern, expanding shape, "on-axis" removal direction, twisted general profile, feathering distal end and crushed butt. It is 2.2 cm long, 0.8 cm wide and 0.4 cm thick.

The re-crested bladelet is a non-cortical proximal fragment (length: 1.6 cm, width: 0.9 cm, thickness: 0.3 cm) with unilateral partial crested preparation and lateral steep profile at midpoint. It has only the following identifiable morphological features: unidirectional scar pattern, flat general profile and crudely-faceted (0.3 x 0.3 cm) butt (semi-lipped, right angle, with no abrasion).

Two secondary crested bladelets are complete pieces with unilateral partial crested preparation and 1 triangular and 1 lateral steep profiles at midpoint. One is non-cortical, while the other is partially cortical with insignificant lateral cortex. Other morphological features: 2 unidirectional scar patterns; 1 parallel and 1 expanding shapes; 1 "on-axis" and 1 "off-axis" removal directions; 2 twisted general profiles; 2 feathering distal ends; 1 crushed and 1 linear (0.3 x 0.1 cm) butt with abrasion. Their sizes are as follows: length – 3.9 and 2.8 cm, width – 0.8 and 0.7 cm, thickness – 0.5 and 0.3 cm.

Core Tablets. The two primary core tablets are on non-cortical blades. One is complete (5.6 cm long, 2.2 cm wide, 0.7 cm thick) with remnants of the core striking platform in the butt area and on 1 lateral edge. Another piece is a distal fragment (4.0 cm long, 2.1 cm wide, 1.2 cm thick) with core striking platform remnants on 1 lateral edge.

Core Trimming Elements. Core Trimming Elements are 2 complete non-cortical flakes with transversal location of 2 unilateral ridges, 1 partial and 1 wholly crested. They have crushed butts and the following sizes: length – 3.6 and 2.8 cm, width – 2.7 and 2.0 cm, thickness – 1.0 and 1.2 cm.

In summarizing the Unit F core maintenance products, it is especially worth noting their similar and unique features that both

unite them with and differentiate them from respective items from Units H and G. On one hand, core maintenance products in the Aurignacian assemblages of the three units are similar in the dominance of pieces with blady (blade, bladelet and microblade) metric proportions among crested pieces: 86.7% for Unit H, 85.4% for the four levels together for Unit G and 82.9% for four levels together for Unit F. In addition, each of the three units includes serial secondary and re-crested pieces, as well as core tablets, clearly showing intensive primary core and carinated piece reduction at the site. On the other hand, bladelet and microblade percentages among crested pieces in the core maintenance products differ between the three units: 13.3% for Unit H, 29.2% for Unit G and 55.7% for Unit F, demonstrating the more intensive bladelet *sensu lato* reduction at the site during the Unit F Aurignacian occupations. The same is also clear when we observe obvious differences between the units in percentages of core tablets on blades and bladelets: 25% for Unit H, 12.5% for Unit G and 45.7% for Unit F with a single core tablet on a bladelet in level Fb1-Fb2 of Unit F. These further "blady data" are in accordance with the presence of bladelet narrow flaked cores/"carinated burins" and carinated burins in Unit F that are absent in Units H and G.

Debitage

This artifacts category from the four archaeological levels of Unit F has the following internal structure for each assemblage (see tabl. 3B and 3C).

Debitage of level Fc (total 36 pieces) is composed of 12 flakes (33.3%), 7 blades (19.5%), 8 bladelets (22.2%) and 9 microblades (25.0%).

Debitage of level Fb1-Fb2 (total 1883 pieces) is composed of 423 flakes (22.5%), 111 blades (5.9%), 358 bladelets (19.0%) and 991 microblades (52.6%).

Debitage of level Fa3 (total 192 pieces) is composed of 63 flakes (32.8%), 30 blades (15.6%), 55 bladelets (28.7%) and 44 microblades (22.9%).

Debitage of level Fa1-Fa2 (total 106 pieces) is composed of 42 flakes (39.6%), 13 blades (12.3%), 32 bladelets (30.2%) and 19 microblades (17.9%).

Flakes

In terms of their condition, flakes from the archaeological levels of Unit F are subdivided into complete and broken pieces, with subsequent distribution of the latter into proximal, medial, distal and longitudinally fragmented ones.

12 flakes of level Fc consist of 9 complete pieces (75%) and 3 broken pieces (25%) – 2 proximal (16.7%) and 1 distal (8.3%) fragments.

423 flakes of level Fb1-Fb2 consist of 352 complete pieces (83.2%) and 71 broken pieces (16.8%) – 32 proximal (7.6%), no medial, 25 distal (5.9%) and 14 longitudinally fragmented (3.3%).

63 flakes of level Fa3 consist of 53 complete pieces (84.1%) and 10 broken pieces (15.9%) – 6 proximal (9.5%), no medial, 2 distal and longitudinally fragmented each (3.2% each).

42 flakes of level Fa1-Fa2 consist of 33 complete pieces (78.6%) and 9 broken pieces (21.4%) – 3 proximal (7.1%), no medial, 2 distal (4.8%) and 4 longitudinally fragmented (9.5%).

Dorsal Scar Pattern. Five scar pattern types are identified on all 12 flakes from level Fc and on 41 flakes from level Fa1-Fa2, all eight scar pattern types on 409 flakes from level Fb1-Fb2 and six scar pattern types on 62 flakes from level Fa3 (see tabl. 4).

	Level Fc	Level Fb1-Fb2	Level Fa3	Level Fa1-Fa2	TOTAL
FLAKES	12 / 33.3%	423 / 22.5%	63 / 32.8%	42 / 39.6%	**540 / 24.4%**
BLADES	7 / 19.5%	111 / 5.9%	30 / 15.6%	13 / 12.3%	**161 / 7.3%**
BLADELETS	8 / 22.2%	358 / 19.0%	55 / 28.7%	32 / 30.2%	**453 / 20.4%**
MICROBLADES	9 / 25.0%	991 / 52.6%	44 / 22.9%	19 / 17.9%	**1063 / 47.9%**
TOTAL	**36 / 1.6%**	**1883 / 84.9%**	**192 / 8.7%**	**106 / 4.8%**	**2217 / 100.0%**

Table 3B - Siuren-I. Unit F. Debitage Structure.

	Level Fc	Level Fb1-Fb2	Level Fa3	Level Fa1-Fa2	TOTAL
BLADES	7 / 29.2%	111 / 7.6%	30 / 23.3%	13 / 20.3%	**161 / %**
BLADELETS	8 / 33.3%	358 / 24.5%	55 / 42.6%	32 / 50.0%	**453 / %**
MICROBLADES	9 / 37.5%	991 / 67.9%	44 / 34.1%	19 / 29.7%	**1063 / %**
TOTAL	**24 / 100.0%**	**1460 / 100.0%**	**129 / 100.0%**	**64 / 100.0%**	**1677 / 100.0%**

Table 3C - Siuren-I. Unit F. Blady Debitage Structure.

Level Fc	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
cortical			4	4 / 26.7%
dorsal-plain			1	1 / 6.7%
lateral			1	1 / 6.7%
crested		3		3 / 20.0%
unidirectional			4	4 / 26.7%
unidirectional-crossed			2	2 / 13.3%
bidirectional				
3-directional				
centripetal				
core tablet				
unidentifiable	1			1
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
cortical	2		23	25 / 5.4%
dorsal-plain	3		14	17 / 3.7%
lateral			16	16 / 3.5%
crested		30		30 / 6.5%
unidirectional	14		291	305 / 66.3%
unidirectional-crossed			39	39 / 8.5%
bidirectional	2		21	23 / 5.0%
3-directional			4	4 / 0.9%
centripetal			1	1 / 0.2%
core tablet		12		12
unidentifiable	4		14	18
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
cortical	1		3	4 / 5.7%
dorsal-plain				
lateral	1		2	3 / 4.3%
crested		3		3 / 4.3%
unidirectional	1		44	45 / 64.3%
unidirectional-crossed	1		6	7 / 10.0%
bidirectional			5	5 / 7.1%
3-directional	1		2	3 / 4.3%
centripetal				
core tablet		7		7
unidentifiable			1	1
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
cortical				
dorsal-plain				
lateral			1	1 / 2.2%
crested		3		3 / 6.5%
unidirectional	1		30	31 / 67.4%
unidirectional-crossed	1		7	8 / 17.4%
bidirectional			1	1 / 2.2%
3-directional			2	2 / 4.3%
centripetal				
core tablet	1			1
unidentifiable			1	1
N	3	3	42	48

DEBITAGE TOTAL (INCLUDING TOOLS & CMP)

4 mm	N	%
flakes	632	24.6%
blades	261	10.1%
bladelets	510	19.8%
microblades	1172	45.5%
TOTAL	2575	100.0

Table 4 - Siuren-I. Unit F. Flake Dorsal Scar Patterns as Percentages of Each Type.

Flakes from level Fc: unidirectional and cortical – 33.3% each, unidirectional-crossed – 16.7%, dorsal-plain and lateral – 8.3% each.

Flakes from level Fb1-Fb2: unidirectional – 71.3%, unidirectional-crossed – 9.5%, cortical – 5.6%, bidirectional – 5.1%, lateral – 3.9%, dorsal-plain – 3.4%, 3-directional – 1% and centripetal – 0.2%.

Flakes from level Fa3: unidirectional – 71.0%, unidirectional-crossed – 9.7%, bidirectional – 8.1%%, cortical – 4.8%, 3-directional and lateral – 3.2% each.

Flakes from level Fa1-Fa2: unidirectional – 73.3%, unidirectional-crossed – 17.1%, 3-directional – 4.8%, bidirectional and lateral – 2.4% each.

Thus, there is a great dominance of unidirectional scar pattern (reaching about three-quarters for all flakes – 71.0-73.3% for levels Fb1-Fb2, Fa3 and Fa1-Fa2) and an obviously poor representation of other scar pattern types in these levels.

Comparison of scar pattern types with presence/absence of cortex seems to be the most informative for the most abundant sample from level Fb1-Fb2 with 108 partially cortical items. The following percentages of pieces with some cortex are calculated for all defined scar pattern types in the level: unidirectional – 25.1%, unidirectional-crossed – 28.2%, bidirectional – 38.1%, lateral – 43.8% and dorsal-plain – 35.7%. These proportions point out a twofold subdivision of partially cortical flakes in accordance with scar pattern types. First, unidirectional and unidirectional-crossed types each have only about a quarter of flakes with cortex. Second, bidirectional, lateral and dorsal-plain types each account for about a third of flakes with cortex. The large number of partially cortical flakes among the latter three scar pattern types may indicate their more auxiliary and preparatory/repreparatory role in primary reduction processes in comparison to more "regular" reduction of flakes with unidirectional and unidirectional-crossed scar pattern types. On the other hand, flake samples from levels Fa3 and Fa1-Fa2 (level Fc is not examined as it has only 3 partially cortical pieces) show much higher percentages of cortical items for each scar pattern type than observed for level Fb1-Fb2. This may be due to the rather limited number (incomplete character) of partially cortical pieces there – 25 in level Fa3 and 16 in level Fa1-Fa2.

Surface Cortex Area and Location. All flakes from each level of Unit F were used for surface cortex area identification. Non-cortical flakes prevail: 50% in level Fc, 69.1% in level Fb1-Fb2, 55.6% in level Fa3 and 61.9% in level Fa1-Fa2. Wholly cortical flakes are poorly represented in the largest flake samples of levels Fb1-Fb2 (5.4%) and Fa3 (4.8%). On the other hand, no wholly cortical flake was found in level Fa10fa2, while the following pieces comprise 25% in the poor flake sample of level Fc. Other flakes are partially cortical – 25% in level Fc, 25.5% in level Fb1-Fb2, 39.6% in level Fa3 and 38.1% in level Fa1-Fa2. Only complete analyzed flakes show similar cortex area: level Fc (9 pieces) – non-cortical – 55.5%, partially cortical and wholly cortical – 22.2% each; level Fb1-Fb2 (352 pieces) – non-cortical – 69.3%, partially cortical – 25.0% and wholly cortical – 5.7%; level Fa3 (53 pieces) – non-cortical – 52.8%, partially cortical – 41.5% and wholly cortical – 5.7%; level Fa1-Fa2 (33 pieces) – non-cortical – 57.6% and partially cortical – 42.4%. Complete partially cortical flakes have the following internal cortex subdivision: pieces with significant cortex – none in level Fc, 21.6% (19 pieces) in level Fb1-fb2, 13.6% (3 pieces) in level Fa3 and 7.1% (1 piece) in level Fa1-Fa2; and pieces with insignificant cortex – 100% (2 pieces) in level Fc, 78.4% (69 pieces) in level Fb1-Fb2, 86.4% (19 pieces) in level Fa3 and 92.9% (13 pieces) in level Fa1-fa2. There is thus a clear dominance of partially cortical flakes with insignificant cortex.

The same samples of whole partially cortical flakes also offers the possibility of recording surface cortex location: level Fc (2 pieces) – lateral cortex – 100%; level Fb1-Fb2 (88 pieces) – lateral cortex – 39.9%, distal cortex – 32.9%, proximal cortex – 12.5%, distal + lateral cortex – 7.9%, proximal + distal cortex – 2.3%; level Fa3 (22 pieces) – distal cortex – 45.5%, lateral cortex – 31.8%, proximal and central cortex – 9.1% each, distal + lateral cortex – 4.5%; level Fa1-Fa2 (14 pieces) – distal cortex – 57.2%, lateral cortex – 28.6%, proximal and central cortex – 7.1% each. Thus, there is just a very minor prevalence of partially cortical pieces with lateral cortex over partially cortical pieces with distal cortex in the most abundant flake sample of level Fb1-Fb2, while, on the other hand, there is a significant prevalence of partially cortical pieces with distal cortex over partially cortical pieces with lateral cortex in the much smaller flake samples of levels Fa3 and Fa1-Fa2.

Shape. The following numbers of flakes with definable shapes were used from each level of Unit F: 11 pieces from level Fc, 370 pieces from level Fb1-Fb2, 58 pieces from level Fa3 and 36 pieces from level Fa1-Fa2 (see tabl. 5).

The expanding type is the most common for all four levels: 54.5% in level Fc, 44.0% in level Fb1-Fb2, 51.8% in level Fa3 and 52.9% in level Fa1-Fa2. The irregular shape type is the second most common in the three largest flake samples: 23.8% in level Fb1-Fb2, 24.1% in level Fa3 and 30.5% in level Fa1-Fa2, while it accounts for only 9.1% in level Fc. Other shape types are represented by variable but usually rare proportions in the different levels. Parallel type: 27.3% in level Fc, 10.0% in level Fb1-Fb2, 8.6% in level Fa3 and 8.3% in level Fa1-Fa2. Converging type: 9.1% in level Fc, 19.5% in level Fb1-Fb2, 10.3% in level Fa3 and none in level Fa1-Fa2. Ovoid type: none in level Fc, 2.7% in level Fb1-Fb2, 5.2% in level Fa3 and 8.3% in level Fa1-Fa2.

There is thus a dominance of expanding shape type (44.0-54.5%) and a moderate number of irregular shape type (23.8-30.5% in the three most representative flake samples of levels Fb1-Fb2, Fa3 and Fa1-Fa2). On the other hand, these three levels show the subordinate position of parallel and converging shape types together – 8.3-29.5%.

Axis. The following numbers of flakes with definable axis of removal direction were used from each level of Unit F: all 12 pieces in level Fc, 367 pieces in level Fb1-Fb2, 55 pieces in level Fa3 and 35 pieces in level Fa1-Fa2 (see tabl. 6).

Level Fc	flakes-tools	flakes-CMP	flakes-debitage	Flakes Total
parallel			3	3 / 21.4%
converging		2	1	3 / 21.4%
expanding	1		6	7 / 50.0%
ovoid				
irregular			1	1 / 7.2%
unidentifiable		1	1	2
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
parallel	2	1	37	40 / 9.7%
converging		4	72	76 / 18.4%
expanding	4	10	163	177 / 43.0%
ovoid	3	2	10	15 / 3.6%
irregular	10	6	88	104 / 25.3%
unidentifiable	6	19	53	78
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
parallel			5	5 / 7.8%
converging		1	6	7 / 11.0%
expanding	2		30	32 / 50.0%
ovoid	2		3	5 / 7.8%
irregular	1		14	15 / 23.4%
unidentifiable		9	5	14
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
parallel			3	3 / 7.7%
converging				
expanding		1	19	20 / 51.3%
ovoid			3	3 / 7.7%
irregular	2		11	13 / 33.3%
unidentifiable	1	2	6	9
N	3	3	42	48

Table 5 - Siuren-I. Unit F. Flake Shapes as Percentages of Each Type.

Level Fc	flakes-tools	flakes-CMP	flakes-debitage	Flakes Total
on-axis	1	2	7	10 / 66.7%
off-axis			5	5 / 33.3%
unidentifiable		1		1
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
on-axis	6	3	63	72 / 17.6%
off-axis	14	20	304	338 / 82.4%
unidentifiable	5	19	56	80
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
on-axis	1		13	14 / 23.0%
off-axis	4	1	42	47 / 77.0%
unidentifiable		9	8	17
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
on-axis	1		9	10 / 26.3%
off-axis	1	1	26	28 / 73.7%
unidentifiable	1	2	7	10
N	3	3	42	48

Table 6 - Siuren-I. Unit F. Flake Axis as Percentages of Each Type.

There is a clear prevalence of "off-axis" type (82.8 in level Fb1-Fb2, 76.4% in level Fa3 and 74.3% in level Fa1-Fa2) over "on-axis" type (17.2% in level Fb1-Fb2, 23.6% in level Fa3 and 25.7% in level Fa1-Fa2), while level Fc shows, in contrast, a slight dominance of "on-axis" type (58.3%) with a subordinate position of "off-axis" type (41.7%).

The good correspondence between the two clusters of axis types and the two clusters of shape types for flakes should be noted for all four levels of Unit F. The dominance of "off-axis" type (74.3 – 82.8%) corresponds to the high number of expanding and irregular shape types (67.8 – 83.4%) in levels Fb1-Fb2, fa3 and Fa1-Fa2, while the dominance of "on-axis" type (58.3%) in level Fc is linked to the lowest percentage of irregular shape type (9.1%) and the highest percentage of parallel shape type (27.3%) in this level.

General Profiles of Flakes. These data are recorded in separate analyses of the set of all definable flakes and the set of complete flakes only (see tabl. 7).

The three most representative levels (Fb1-Fb2, Fa3 and fa1-Fa2) show individual dominance of twisted type over any other type, although "regular" types (flat, incurvate medial and incurvate distal ones) taken together are either about equal to twisted type (level Fb1-Fb2) or slightly more representative (levels Fa3 and fa1-Fa2). In contrast, the flakes from level Fc are characterized, however, by an insignificant number of twisted profile, while "regular" types are much more common. The results obtained for all definable flakes and complete flakes only are generally similar and do not show any significant differences. These data are presented below.

Level Fc. There are all 12 definable flakes with the following general profile types: incurvate medial – 41.6%, flat, convex and twisted – 16.7% each, incurvate distal – 8.3%. For 9 complete flakes: incurvate medial – 44.4%, twisted – 22.2%, flat, incurvate distal and convex – 11.1% each.

Level Fb1-Fb2. There are 385 definable flakes with the following general profile types: 48.0% twisted type, 26.5% incurvate medial type, 11.4% incurvate distal type, 8.6% flat type and 5.5% convex type. For 352 complete flakes: 46.3% twisted type, 27.6% incurvate medial type, 12.2% incurvate distal type, 8.5% flat type and 5.4% convex type.

Level Fa3. There are 59 definable flakes with the following general profile types: twisted – 39.0%, incurvate medial – 27.1%, flat – 15.2%, incurvate distal – 11.9% and convex – 6.8%. For 53 complete flakes: 41.6% twisted type, 22.6% of incurvate medial type, 17.0% flat type, 11.3% incurvate distal type and 7.5% convex type.

Level Fa1-Fa2. There are 38 definable flakes with the following general profile types: twisted – 39.5%, incurvate medial – 34.2%, incurvate distal – 18.4% and convex – 7.9%. For 33 complete flakes: 39.4% incurvate medial type, 33.3% twisted type, 18.2% incurvate distal type and 9.1% convex type. No flat type was found for flakes in this level.

Level Fc	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
flat			2	2 / 13.3%
incurvate medial		1	5	6 / 40.0%
incurvate distal	1		1	2 / 13.3%
convex			2	2 / 13.3%
twisted		1	2	3 / 20.0%
unidentifiable		1		1
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
flat	4	3	33	40 / 9.3%
incurvate medial	3	3	102	108 / 25.1%
incurvate distal	2	4	44	50 / 11.6%
convex	4	1	21	26 / 6.1%
twisted	9	12	185	206 / 47.9%
unidentifiable	3	19	38	60
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
flat	1		9	10 / 15.4%
incurvate medial		1	16	17 / 26.2%
incurvate distal			7	7 / 10.7%
convex	2		4	6 / 9.2%
twisted	2		23	25 / 38.5%
unidentifiable		9	4	13
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
flat				
incurvate medial	2	1	13	16 / 39.0%
incurvate distal			7	7 / 17.1%
convex			3	3 / 7.3%
twisted			15	15 / 36.6%
unidentifiable	1	2	4	7
N	3	3	42	48

Table 7 - Siuren-I. Unit F. Flake General Profiles as Percentages of Each Type.

Level Fc	flakes-tools	flakes-CMP	flakes-debitage	Flakes Total
feathering	1	2	6	9 / 69.2%
hinged			4	4 / 30.8%
overpassed				
blunt				
unidentifiable		1	2	3
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
feathering	11	11	273	295 / 73.4%
hinged	4	3	58	65 / 16.2%
overpassed	1	1	6	8 / 2.0%
blunt	3	2	29	34 / 8.4%
unidentifiable	6	25	57	88
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
feathering	3		38	41 / 75.9%
hinged	1		3	4 / 7.4%
overpassed			1	1 / 1.9%
blunt		1	7	8 / 14.8%
unidentifiable	1	9	14	24
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
feathering	1	1	24	26 / 70.3%
hinged			2	2 / 5.4%
overpassed			2	2 / 5.4%
blunt	1		6	7 / 18.9%
unidentifiable	1	2	8	11
N	3	3	42	48

Table 8 - Siuren-I. Unit F. Flake Profiles at Distal End as Percentages of Each Type.

Profiles at Distal End. Data for these analyses are based on the following number of identifiable flakes from each level of Unit F: 10 from level Fc, 366 from level Fb1-Fb2, 49 from level Fa3 and 34 from level Fa1-Fa2. Data on the representation of the different types are given below (see tabl. 8).

Level Fc: feathering – 60% and hinged – 40%.
Level Fb1-Fb2: feathering – 74.6%, hinged – 15.9%, blunt – 7.9% and overpassed – 1.6%.
Level Fa3: feathering – 77.6%, blunt – 14.3%, hinged – 6.1% and overpassed – 2.0%.
Level Fa1-Fa2: feathering – 70.6%, blunt – 17.6%, hinged and overpassed – 5.9% each.

So, the three most representative flake samples from levels Fb1-Fb2, Fa3 and Fa1-Fa2 show very similar dominance of feathering type – 70.6-77.6%. Other types are represented by different proportions, although a moderate number of "not regular" types (hinged and overpassed – 17.5%) in the most abundant flake sample of level Fb1-Fb2 is notable.

Profiles at Midpoint. Data for these analyses were recorded on the following definable flakes from each level of Unit F: all 12 from level Fc, 403 from level Fb1-Fb2, 62 from level Fa3 and 40 from level Fa1-Fa2. Detailed data on the variety of types are represented below (see tabl. 9).

Level Fc: trapezoidal – 25.0%, flat, triangular, lateral steep and irregular – 16.7% each, crescent – 8.3%.
Level Fb1-Fb2: irregular – 27.5%, trapezoidal – 25.8%, triangular – 19.6%, multifaceted – 17.6%, flat – 6.0%, crescent – 2.5% and lateral steep – 1.0%.
Level Fa3: multifaceted – 30.7%, trapezoidal – 22.6%, irregular – 21.0%, triangular – 19.3%, flat and crescent – 3.2% each.
Level Fa1-Fa2: irregular – 32.5%, trapezoidal and multifaceted – 22.5% each, triangular – 17.5% and flat – 5.0%.

The variable representation of profiles at midpoint types in each level allows us, nonetheless, to note some regularities for the three most representative flake samples from levels Fb1-Fb2, Fa3 and Fa1-Fa2. First, triangular, trapezoidal and multifaceted types together occupy the dominant position – 62.5-72.6%, where the latter two types, as pronounced indicators of intensive primary reduction, together make up as much as 43.4-53.3%. At the same time, irregular type fluctuates from 21.0% to 32.5%. The quite different range of types in level Fc can be explained by insufficient sample size.

Butt Types. This analysis is based on the following number of flake butts from each level of Unit F: 11 from level Fc, 384 from level Fb1-Fb2, 59 from level Fa3 and 36 from level Fa1-Fa2. Their representation is quoted below (see tabl. 10).

Level Fc: plain – 36.3%, linear – 27.3%, dihedral, crudely-faceted, finely-faceted and crushed – 9.1% each.
Level Fb1-Fb2: plain – 24.5%, linear – 19.0%, punctiform – 16.1%, dihedral – 7.8%, crudely-faceted – 5.5%, finely-faceted – 2.6%, cortical – 0.5% and crushed – 24.0%.
Level Fa3: plain – 30.6%, punctiform – 22.0%, linear – 13.5%, dihedral – 8.5%, finely-faceted – 5.1%, cortical – 3.4%, crudely-

Level Fc	flakes-tools	flakes-CMP	flakes-debitage	Flakes Total
flat			2	2 / 13.3%
triangular			2	2 / 13.3%
trapezoidal			3	3 / 20.0%
multifaceted	1			1 / 6.7%
lateral steep		2	2	4 / 26.7%
crescent			1	1 / 6.7%
irregular			2	2 / 13.3%
unidentifiable		1		1
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
flat	4		24	28 / 6.2%
triangular	1	6	79	86 / 19.2%
trapezoidal	6		104	110 / 24.5%
multifaceted	6		71	77 / 17.1%
lateral steep		14	4	18 / 4.0%
crescent	1		10	11 / 2.4%
irregular	5	3	111	119 / 26.6%
unidentifiable	2	19	20	41
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
flat	1		2	3 / 4.4%
triangular	1	1	12	14 / 20.6%
trapezoidal			14	14 / 20.6%
multifaceted			19	19 / 28.0%
lateral steep				
crescent			2	2 / 2.9%
irregular	3		13	16 / 23.5%
unidentifiable		9	1	10
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
flat			2	2 / 4.7%
triangular	1		7	8 / 18.6%
trapezoidal			9	9 / 20.9%
multifaceted			9	9 / 20.9%
lateral steep		1		1 / 2.3%
crescent				
irregular	1		13	14 / 32.6%
unidentifiable	1	2	2	5
N	3	3	42	48

Table 9 - Siuren-I. Unit F. Flake Profiles at Midpoint as Percentages of Each Type.

faceted – 1.7% and crushed – 15.2%.
Level Fa1-Fa2: plain – 33.4%, linear – 16.7%, punctiform – 11.1%, dihedral and crudely-faceted – 8.3% each, crushed – 22.2%.

Thus, the most common group of flake butt types is "plain-punctiform-linear" – 59.6-66.1% for all four levels. At the same time, about 15.3-16.6% of all butts are dihedral or faceted in the three most representative flake samples of levels Fb1-Fb2, Fa3 and Fa1-Fa2. Cortical butts either do not occur at all (levels Fc and Fa1-Fa2) or are rare (0.5% in level Fb1-Fb2 and 3.4% in level Fa3).

Lipping. The following numbers of flake butts suitable for lipping identification in each level of Unit F were used: 10 in level Fc, 235 in level Fb1-Fb2, 42 in level Fa3 and 24 in level Fa1-Fa2. Lipping characteristics are represented below (see tabl. 11).
Level Fc: semi-lipped – 90% and lipped – 10%.
Level Fb1-Fb2: semi-lipped – 92.7%, lipped – 4.7% and not lipped – 2.6%.
Level Fa3: semi-lipped – 97.6% and lipped – 2.4%.
Level Fa1-Fa2: semi-lipped – 95.8% and not lipped – 4.2%.

So, semi-lipped butts are the obvious most characteristic type – 90.0-97.6% for flake butts in all four levels. Lipped and not lipped butts occur in levels Fc, Fa3 and Fa1-Fa2 in either as single or rare cases only and, therefore, their presence or absence is not insignificant. In contrast, there is a prevalence of lipped butts (11 examples) over not lipped butts (6 examples) – 1.8:1 in level Fb1-Fb2.

Butt Angle. The following numbers of flake butts suitable for angle identification in each level of Unit F were used: 10 in level Fc, 235 in level Fb1-Fb2, 50 in level Fa3 and 22 in level Fa1-Fa2. Their angle characteristics are as follows (see tabl. 12).

Level Fc	flakes-tools	flakes-CMP	flakes-debitage	Flakes Total
cortical				
plain		2	4	6 / 40.0%
punctiform				
linear			3	3 / 20.0%
dihedral			1	1 / 6.7%
crudly-faceted			1	1 / 6.7%
finely-faceted			1	1 / 6.7%
crushed	1	1	1	3 / 20%
missing			1	1
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
cortical			2	2 / 0.5%
plain	5	6	94	105 / 24.7%
punctiform	2	4	62	68 / 16.0%
linear	3	2	73	78 / 18.4%
dihedral	1	3	30	34 / 8.0%
crudly-faceted		1	21	22 / 5.2%
finely-faceted			10	10 / 2.3%
crushed	7	7	92	106 / 24.9%
missing	7	19	39	65
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
cortical			2	2 / 3.1%
plain	2		18	20 / 30.8%
punctiform	1		13	14 / 21.5%
linear			8	8 / 12.3%
dihedral	1	1	5	7 / 10.8%
crudly-faceted	1		1	2 / 3.1%
finely-faceted			3	3 / 4.6%
crushed			9	9 / 13.8%
missing		9	4	13
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
cortical				
plain			12	12 / 31.6%
punctiform			4	4 / 10.5%
linear		1	6	7 / 18.4%
dihedral			3	3 / 7.9%
crudly-faceted			3	3 / 7.9%
finely-faceted				
crushed	1		8	9 / 23.7%
missing	2	2	6	10
N	3	3	42	48

Table 10 - Siuren-I. Unit F. Flake Butt Types as Percentages of Each Type.

Level Fc: semi-acute and right – 50% each.
Level Fb1-Fb2: semi-acute – 75.3%, right – 20.9% and acute – 3.8%.
Level Fa3: semi-acute – 83.3%, right – 14.3% and acute – 2.4%.
Level Fa1-Fa2: semi-acute – 68.2% and right – 31.8%.

Some patterns can be observed here. The poor flake samples of levels Fc and Fa1-Fa2 do not show any occurrence of butts with acute angle and, moreover, when they are present, they are much less represented in comparison to butts with right angle – 1:5.5 in level Fb1-Fb2 and 1:5.9 in level Fa3. On the other hand, butts with semi-acute angle are very common in levels Fb1-Fb2 and Fa3 – 75.3-83.3%.

Butt Abrasion. The following quantity of identifiable flake butts were used to record presence/absence of abrasion in the four levels of Unit F: 11 from level Fc, 268 from level Fb1-Fb2, 50 from level Fa3 and 23 from level Fa1-Fa2. Their abrasion data are as follows (see tabl. 13).

Level Fc: present – 9.1% and absent – 90.9%.
Level Fb1-Fb2: present – 74.6% and absent – 25.4%.
Level Fa3: present – 66.0% and absent – 34.0%.
Level Fa1-Fa2: present – 65.2% and absent – 34.8%.

Aside from the poor sample of level Fc, flakes in Unit F show a dominance of butts with abrasion (65.2-74.6%), although butts with no abrasion account for a significant number –

Level Fc	flakes-tools	flakes-CMP	flakes-debitage	Flakes Total
lipped			1	1 / 8.3%
semi-lipped		2	9	11 / 91.7%
not lipped				
unidentifiable	1	1	2	4
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
lipped			11	11 / 4.2%
semi-lipped	11	12	218	241 / 93.1%
not lipped		1	6	7 / 2.7%
unidentifiable	14	29	188	231
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
lipped			1	1 / 2.1%
semi-lipped	4	1	41	46 / 97.9%
not lipped				
unidentifiable	1	9	21	31
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
lipped				
semi-lipped		1	23	24 / 96%
not lipped			1	1 / 4%
unidentifiable	3	2	18	23
N	3	3	42	48

Table 11 - Siuren-I. Unit F. Flake Butt Lipping as Percentages of Each Type.

Level Fc	flakes-tools	flakes-CMP	flakes-debitage	Flakes Total
right		2	5	7 / 58.3%
semi-acute			5	5 / 41.7%
acute				
unidentifiable	1	1	2	4
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
right	1	2	49	52 / 20.0%
semi-acute	10	11	177	198 / 76.5%
acute			9	9 / 3.5%
unidentifiable	14	29	188	231
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
right	2		6	8 / 17.0%
semi-acute	1	1	35	37 / 78.7%
acute	1		1	2 / 4.3%
unidentifiable	1	9	21	31
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
right			7	7 / 30.4%
semi-acute		1	15	16 / 69.6%
acute				
unidentifiable	3	2	20	25
N	3	3	42	48

Table 12 - Siuren-I. Unit F. Flake Butt Angles as Percentages of Each Type.

from a quarter in level Fb1-Fb2 to a third in levels Fa3 and Fa1-Fa2.

Metrics (Length, Width, Thickness) of Flakes. Metric data are mainly based on the analysis of complete flakes from each level, with some additional comparable information also obtained from broken flakes.

Length. The most common group of complete flakes in terms of length is in the interval 1.6-2.5 cm – 77.7% for level Fc, 60.5% for level Fb1-Fb2, 49.0% for level Fa3 and 63.5% for level Fa1-Fa2. As a whole, flakes with length in the interval 0.5-3.0 cm compose the following number – 88.8% for level Fc, 90.1% for level Fb1-Fb2, 81.1% for level Fa3 and 69.6% for level Fa1-Fa2. The remaining rather small number of flakes

Level Fc	flakes-tools	flakes-CMP	flakes-debitage	Flakes Total
present		1	1	2 / 15.4%
absent		1	10	11 / 84.6%
unidentifiable	1	1	1	3
N	1	3	12	16
Level Fb1-Fb2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
present	9	5	200	214 / 73.3%
absent	2	8	68	78 / 26.7%
unidentifiable	14	29	155	198
N	25	42	423	490
Level Fa3	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
present	2	1	33	36 / 64.3%
absent	3		17	20 / 35.7%
unidentifiable		9	13	22
N	5	10	63	78
Level Fa1-Fa2	**flakes-tools**	**flakes-CMP**	**flakes-debitage**	**Flakes Total**
present		1	15	16 / 66.7%
absent			8	8 / 33.3%
unidentifiable	3	2	19	24
N	3	3	42	48

Table 13 - Siuren-I. Unit F. Flake Butt Abrasion as Percentages of Each Type.

have length more than 3 cm but pieces with length more than 5 cm among them account only 1-2 pieces – 11.1% for level Fc, 0.6% for level Fb1-Fb2, 1.9% for level Fa3 and none for level Fa1-Fa2. Moreover, no flake is longer than 6 cm. Mean length for complete flakes in each level is as follows: 2.5 cm for levels Fc and Fa1-Fa2, 2.4 cm for level Fa3 and 2.1 cm for level Fb1-Fb2. Taking into account that the most numerous flake sample of level Fb1-Fb2 has the lowest mean length for flakes (2.1 cm), we should accept this length as the most typical for flakes in Unit F. Unit F complete flakes are thus quite short.

The analysis of broken flakes shows that the great majority is in the interval 0.5-3.0 cm – 66.6% for level Fc, 86.0% for level Fb1-Fb2, 90.0% for level Fa3 and 88.8% for level Fa1-Fa2. Moreover, no broken flake in any of the four levels exceeds 5 cm.

Width. The most common group of complete flakes in terms of width is in the interval 1.6-2.5 cm – 77.7% for level Fc, 52.0% for level Fb1-Fb2, 51.0% for level Fa3 and 42.4% for level Fa1-Fa2. Complete flakes with width in the interval 0.5-3.0 cm comprise 88.8% for level Fc, 93.5% for level Fb1-Fb2, 86.8% for level Fa3 and 72.7% for level Fa1-Fa2. The remaining pieces have width of more than 3 cm but only one or two have width more than 5 cm – none for level Fc, 0.6% (including one piece with width 6.1 cm) for level Fb1-Fb2, 1.9% for level Fa3 and 3.0% for level Fa1-Fa2. Mean width for complete flakes in each level is as follows: 1.9 cm for levels Fc and Fb1-Fb2, 2.3 cm for level Fa3 and 2.5 cm for level Fa1-Fa2. Mean width of 1.9 cm for the largest flake sample from level Fb1-Fb2 should be considered the most typical width for flakes in Unit F.

Analysis of broken flakes confirms the results from complete flakes. Many broken flakes have width in the interval 0.5-3.0 cm – 100% for level Fc, 94.4% for level Fb1-Fb2, 80.0% for level Fa3 and 88.8% for level Fa1-Fa2. No broken flake has width of more than 5 cm.

Now let us look at the correlation between length and width of flakes from the four levels of Unit F. Only level Fa1-Fa2 has an "ideal complete flake" with shortened, transversal proportions – 2.5 cm L = 2.5 cm W. Flakes from the other three levels show the prevalence of mean length over mean width: 2.5 cm L > 1.9 cm for level Fc, 2.1 cm L > 1.9 cm W for level Fb1-Fb2 and 2.4 cm L > 2.3 cm W for level Fa3, although for the latter two levels the noted difference is only 1-2 mm. In contrast, the prevalence of mean length over mean width for flakes finds further support in only a moderate number of flakes with shortened, transversal proportions (L<= W) – 3 pieces/33.3% for level Fc, 146 pieces/41.5% for level Fb1-Fb2, 14 pieces/42.4% for level Fa1-Fa2 and only in level Fa3 do such flakes comprise half of all complete flakes – 27 pieces/50.9%. Along with this, the number of elongated flakes (L > 1.5 W) is rather moderate as well – 3 pieces/33.3% for level Fc, 95 pieces/27.0% for level Fb1-Fb2, 13 pieces/24.5% for level Fa3 and 7 pieces/21.2% for level Fa1-Fa2. Thus, length of complete flakes is generally more pronounced than flake width in Unit F.

Thickness. Mean thickness for both complete and broken flakes is as follows: 0.3 cm for level Fc and 0.4 cm for levels Fb1-Fb2, Fa3 and Fa1-Fa2. Flakes in the interval 0.1-0.5 cm comprise 88.8% for complete and 100% for broken flakes in level Fc, 85.8% for complete and 81.7% for broken flakes in level Fb1-Fb2, 67.9% for complete and 70% for broken flakes in level Fa3 and 69.7% for complete and 66.6% for broken flakes in level Fa1-Fa2. Moreover, just a few flakes have thickness more than 1.0 cm: 1.7% for complete and 2.8% for broken flakes in level Fb1-Fb2, 3.0% for complete and none for broken flakes in level Fa1-Fa2. None were noted in levels Fc and Fa3. Nonetheless, even the minimal presence of relatively thick flakes in worth mentioning. Thus, flakes of all four levels of Unit F are fairly thin.

Butt Sizes. Mean metric data for flake butts are similar for all four levels of Unit F. They are as follows for butt width: 0.7 cm for

level Fc (10 butts), 0.9 cm for level Fb1-Fb2 (230 butts), 1.0 cm for both levels Fa3 (37 butts) and Fa1-Fa2 (24 butts). They are as follows for butt height: 0.3 cm for all four levels. Plain butts have the following width – 0.6 cm for level Fc (4 butts), 0.8 cm for level Fb1-Fb2 (94 butts) and level Fa1-Fa2 (12 butts), 1.0 cm for level Fa3 (18 butts) and have the following height – 0.3 cm for all four levels.

Thus, the flakes of Unit F on the basis of the most representative flake samples of levels Fb1-Fb2, Fa3 and Fa1-Fa2 can be generally characterized by:

- a great dominance of unidirectional scar pattern (71.0-73.3%) and a small representation of other scar pattern types (usually less than 10% each);
- surface cortex area and location data: a prevalence of non-cortical pieces (55.6-69.1%) and a low number of wholly cortical pieces (4.8-5.4% for levels Fb1-Fb2 and Fa3 only); a slight domination of lateral cortex for partially cortical flakes in level Fb1-Fb2 and significant predominance of distal cortex for partially cortical flakes in levels Fa3 and Fa1-Fa2 where few have significant cortex (7.1-13.6% in levels Fa1-Fa2 and Fa3, and 21.6% in level Fb1-Fb2);
- a presence of one cluster of flake samples based on shape and axis: a high number of expanding and irregular shape types (67.8-83.4% together) correspond to the dominance of "off-axis" type of removal direction (74.3-82.8%);
- a near-equal representation of "regular" (flat, incurvate medial and incurvate distal) types of general profiles (46.5% for all definable flakes and 48.3% for complete flakes) and twisted type (48.0% for all definable flakes and 46.3% for complete flakes) in level Fb1-Fb2, or a prevalence of the former types (52.6-54.2% for all definable flakes and 50.9-57.6% for complete flakes) over the latter type (39.0-39.5% for all definable flakes and 33.3-41.6% for complete flakes) in levels Fa3 and Fa1-Fa2;
- a dominance of feathering distal ends (70.6 – 74.6%) for flakes in all three levels, while "not regular" (hinged and overpassed) types show a moderate number (17.5% together) only for flakes in level Fb1-Fb2;
- a dominance of triangular, trapezoidal and multifaceted type of profiles at midpoint (62.5-72.6%) where the latter two types have a significant percentage (43.4-53.3%), although the irregular type is also important (21.0-32.5%);
- a dominance of the "plain-punctiform-linear" group of butt types (59.6-66.1%) with notable presence of all five other butt types, although cortical ones are the least common (0.5% in level Fb1-Fb2, 3.4% in level Fa3 and absent in level Fa1-Fa2);
- a dominance of semi-lipped butts with semi-acute angle with, at the same time, a low number of lipped butts with acute angle and unlipped butts with mainly right angle;
- a prevalence of flakes with butt abrasion (65.2-74.6%) over flakes with no butt abrasion (25.4-34.8%);
- a dominance of small pieces (2.1 cm L > 1.9 cm W for level Fb1-Fb2; 2.4 cm L > 2.3 cm W for level Fa3 and 2.5 cm L = 2.5 cm W for level Fa1-Fa2 using mean data) with no prevalence of flakes with shortened, transversal proportions (L <= W) - 41.5-42.4% for levels Fb1-Fb2 and Fa1-Fa2, and 50.9% for level Fa3, as well as a rather moderate quantity of elongated flakes (L > 1.5 W) – 21.2-27.0%, while mean thickness is 0.4 cm for flakes in all three levels.

Blades

Blades are rather poorly represented in levels Fc, Fa3 and Fa1-Fa2 and a statistically sufficient amount is found only in level Fb1-Fb2. In terms of their condition, blades from the four archaeological levels of Unit F are subdivided into complete and broken pieces, with further distribution of the latter into proximal, medial and distal fragments.

Seven blades in level Fc consist of 3 complete (42.9%) and 4 broken (all distal) pieces (57.1%).

111 blades of level Fb1-Fb2 consist of 34 complete (30.7%) and 77 broken pieces (69.3%) – 32 proximal (28.8%), 21 medial (18.9%) and 24 distal (21.6%).

30 blades of level Fa3 consist of 8 complete (26.7%) and 22 broken pieces (73.3%) – 11 proximal (36.6%), 5 medial (16.7%) and 6 distal (20.0%).

13 blades of level Fa1-Fa2 consist of 6 complete (46.1%) and 7 broken pieces (53.9%) – 4 proximal (30.8%), 2 medial (15.4%) and 1 distal (7.7%).

Dorsal Scar Pattern. Two scar pattern types have been identified on all 7 blades from level Fc, five on 110 definable blades from level Fb1-Fb2, four on all 30 blades from level Fa3 and three on all 13 blades from level Fa1-Fa2. Thus, there is a correlation between the number of blades and the number of scar pattern types identified in each level. Separately, blades from each level have the following scar pattern type representation (see tabl. 14).

Blades of level Fc: unidirectional – 85.7% and bidirectional – 14.3%.
Blades of level Fb1-Fb2: unidirectional – 70.0%, unidirectional-crossed – 20.0%, bidirectional – 5.5%, lateral – 3.6% and dorsal-plain – 0.9%.
Blades of level Fa3: unidirectional – 83.5%, unidirectional-crossed and bidirectional – 6.6% each, 3-directional – 3.3%.
Blades of level Fa1-Fa2: unidirectional – 76.9%, bidirectional – 15.4% and unidirectional-crossed – 7.7%.

Thus, there is a clear dominance of unidirectional scar pattern – 70.0-85.7%. The presence of one to four other defined scar pattern types is notable, although their occasional and/or preparatory/repreparatory character is the most probable.

Comparison of scar pattern types with presence/absence of cortex on blades revealed the following pattern. Aside from level Fb1-Fb2, all but three scar pattern types (unidirectional-crossed, bidirectional, 3-directional) lack dorsal cortex in levels Fc, Fa3 and Fa1-Fa2. At the same time, specimens with cortex among unidirectional blades comprise a rather stable moderate number – 16.7% in level Fc, 19.5% in level Fb1-Fb2, 24.0% in level Fa3 and 20.0% in level Fa1-Fa2. Additionally, level Fb1-Fb2 is characterized by the following partially cortical blades: 18.2% (4 pieces) with unidirectional-crossed scar pattern, 50.0% (3 pieces) with bidirectional scar pattern, 75.0% (3 pieces) with lateral scar pattern, while a single dorsal-plain blade is non-cortical. Thus, the number of unidirectional-crossed blades with

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
cortical				
dorsal-plain				
lateral				
crested		2		2 / 20%
unidirectional	1		6	7 / 70%
unidirectional-crossed				
bidirectional			1	1 / 10%
3-directional				
centripetal				
core tablet				
unidentifiable				
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
cortical	1			1 / 0.6%
dorsal-plain			1	1 / 0.6%
lateral			4	4 / 2.3%
crested	2	28		30 / 17.4%
unidirectional	29		77	106 / 61.6%
unidirectional-crossed	2		22	24 / 14.0%
bidirectional			6	6 / 3.5%
3-directional				
centripetal				
core tablet		11		11
unidentifiable	3		1	4
N	37	39	111	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
cortical				
dorsal-plain				
lateral				
crested		9		9 / 21.4%
unidirectional	3		25	28 / 66.6%
unidirectional-crossed			2	2 / 4.8%
bidirectional			2	2 / 4.8%
3-directional			1	1 / 2.4%
centripetal				
core tablet		2		2
unidentifiable	1			1
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
cortical				
dorsal-plain				
lateral				
crested		4		4 / 21.0%
unidirectional	2		10	12 / 63.2%
unidirectional-crossed			1	1 / 5.3%
bidirectional			2	2 / 10.5%
3-directional				
centripetal				
core tablet				
unidentifiable				
N	2	4	13	19

Table 14 - Siuren-I. Unit F. Blade Dorsal Scar Patterns as Percentages of Each Type.

some cortex in level Fb1-Fb2 fits well with the proportion of partially cortical unidirectional blades for each of the Unit F four levels. On the other hand, bidirectional and lateral blades in level Fb1-Fb2 have cortex two to three times more often, which may indicate their auxiliary and preparatory/repreparatory role in primary reduction processes, especially given the total low number of blades with such scar pattern types.

Surface Cortex Area and Location. All blades from each level of Unit F were used for surface cortex area identification. Non-cortical blades prevail – 85.7% in level Fc, 76.6% in level Fb1-Fb2, 80.0% in level Fa3 and 84.6% in level Fa1-Fa2. Wholly cortical blades are absent. All other blades are partially cortical – 14.3% in level Fc, 23.4% in level Fb1-Fb2, 20.0% in level Fa3 and 15.4% in level Fa1-Fa2. Taken separately, complete

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
parallel			3	3 / 30%
converging		2		20 / 20%
expanding	1		2	3 / 30%
ovoid				
irregular			2	20 / 20%
unidentifiable				
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
parallel	4	4	59	67 / 49.0%
converging	7	7	20	34 / 24.8%
expanding	2	3	10	15 / 10.9%
ovoid				
irregular	5	6	10	21 / 15.3%
unidentifiable	19	19	12	50
N	37	39	111	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
parallel	1		4	5 / 20.8%
converging		2	5	7 / 29.2%
expanding		4	2	6 / 25.0%
ovoid				
irregular		2	4	6 / 25.0%
unidentifiable	3	3	15	21
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
parallel		1	7	8 / 57.2%
converging				
expanding		1	2	3 / 21.4%
ovoid				
irregular		1	2	3 / 21.4%
unidentifiable	2	1	2	5
N	2	4	13	19

Table 15 - Siuren-I. Unit F. Blade Shapes as Percentages of Each Type.

blades show the following cortex area data: level Fc (3 pieces) – non-cortical – 66.6% and partially cortical – 33.3%; level Fb1-Fb2 (34 pieces) – non-cortical – 67.6% and partially cortical – 32.4%; level Fa3 (8 pieces) – non-cortical –and partially cortical – 50% each; level Fa1-Fa2 (6 pieces) – non-cortical – 66.6% and partially cortical – 33.3%. Complete partially cortical blades have the following internal cortex subdivision: pieces with significant cortex – 100% (1 piece) in level Fc, 63.6% (7 pieces) in level Fb1-Fb2, none in levels Fa3 and Fa1-Fa2; and pieces with insignificant cortex – none in level Fc, 36.4% (4 pieces) in level Fb1-Fb2, 100% in levels Fa3 (4 pieces) and Fa1-Fa2 (2 pieces).

Surface cortex location was recorded on the same samples of complete partially cortical blades: distal cortex (1 piece) in level Fb1-Fb2, 25% (1 piece) in level Fa3 and 100% (2 pieces) in level Fa1-Fa2; lateral cortex – 81.8% (9 pieces) in level Fb1-Fb2 and 50% (2 pieces) in level Fa3; distal + lateral cortex – 100% (1 piece) in level Fc and 9.1% (1 piece) in level Fb1-Fb2; proximal cortex – 25% (1 piece) in level Fa3. Taking into account the largest blade samples for these analyses (levels Fb1-Fb2 and Fa3), lateral cortex location is the most common for blades.

Shape. The following blades with definable shapes were used from each level of Unit F: all 7 pieces of level Fc, 105 pieces of level Fb1-Fb2, 25 pieces of level Fa3 and 11 pieces of level Fa1-Fa2 (see tabl. 15). They have the following shape types:

Blades of level Fc: parallel – 42.9%, expanding and irregular – 28.6% each.
Blades of level Fb1-Fb2: parallel – 59.6%, converging – 20.2%, expanding and irregular – 10.1% each.
Blades of level Fa3: converging – 33.3%, parallel and irregular – 26.7% each, expanding – 13.3%.
Blades of level Fa1-Fa2: parallel – 63.6%, expanding and irregular – 18.2% each.

So, parallel shape dominates alone in levels Fb1-Fb2 and Fa1-Fa2, and together with converging shape in level Fa3, while level Fc is characterized by the dominance of expanding and irregular shapes.

Axis. The following blades with definable axis of removal direction were used from each level of Unit F: all 7 pieces in level Fc, 105 pieces in level Fb1-Fb2, 14 pieces in level Fa3 and 11 pieces in level Fa1-Fa2 (see tabl. 16).

There is a clear dominance of "on-axis" type of removal direction for blades in three levels: 80% in both levels Fc and Fb1-Fb2, and 90.9% in level Fa1-Fa2. On the other hand, blades of level Fa3 are characterized by the prevalence of "off-axis" type (64.3%) over "on-axis" type (35.7%).

The resulting difference between blades from level Fa3 and those of levels Fb1-Fb2 and Fa1-Fa2 corresponds to the high-

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
on-axis	1	2	5	8 / 80%
off-axis			2	2 / 20%
unidentifiable				
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
on-axis	8	6	84	98 / 68.1%
off-axis	14	11	21	46 / 31.9%
unidentifiable	15	22	6	43
N	37	39	111	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
on-axis	2		5	7 / 29.2%
off-axis	1	7	9	17 / 70.8%
unidentifiable	1	4	16	21
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
on-axis		1	10	11 / 73.3%
off-axis	1	2	1	4 / 26.7%
unidentifiable	1	1	2	4
N	2	4	13	19

Table 16 - Siuren-I. Unit F. Blade Axis as Percentages of Each Type.

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
flat			1	1 / 10%
incurvate medial		1		1 / 10%
incurvate distal			1	1 / 10%
convex				
twisted	1	1	5	7 / 70%
unidentifiable				
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
flat	4	1	6	11 / 7.1%
incurvate medial	4	4	24	32 / 20.8%
incurvate distal	1		6	7 / 4.6%
convex			1	1 / 0.6%
twisted	20	15	68	103 / 66.9%
unidentifiable	8	19	6	33
N	37	39	111	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
flat			2	2 / 5.7%
incurvate medial	1	6	3	10 / 28.6%
incurvate distal				
convex			1	1 / 2.8%
twisted	1	2	19	22 / 62.9%
unidentifiable	2	3	5	10
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
flat			1	1 / 6.7%
incurvate medial		3		3 / 20.0%
incurvate distal				
convex			2	2 / 13.3%
twisted	1	1	7	9 / 60.0%
unidentifiable	1		3	4
N	2	4	13	19

Table 17 - Siuren-I. Unit F. Blade General Profiles as Percentages of Each Type.

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
feathering		2	5	7 / 70%
hinged	1		1	2 / 20%
overpassed				
blunt			1	1 / 10%
unidentifiable				
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
feathering	7	13	36	56 / 63.7%
hinged			1	1 / 1.1%
overpassed	1		3	4 / 4.5%
blunt	4	6	17	27 / 30.7%
unidentifiable	25	20	54	99
N	37	39	111	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
feathering	1	6	8	15 / 71.4%
hinged			1	1 / 4.8%
overpassed				
blunt		1	4	5 / 23.8%
unidentifiable	3	4	17	24
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
feathering		2	2	4 / 44.4%
hinged				
overpassed			3	3 / 33.3%
blunt			2	2 / 22.2%
unidentifiable	2	2	6	10
N	2	4	13	19

Table 18 - Siuren-I. Unit F. Blade Profiles at Distal End as Percentages of Each Type.

est rate of expanding and irregular shapes for blades of the former level (40% together). On the other hand, the most representative blade sample of level Fb1-Fb2 shows a strong correlation of parallel and converging shapes (79.8% together) and "on-axis" type of removal direction (80%).

General Profiles of Blades. These data are based on separate analyses of all definable blades (see tabl. 17) and complete blades only.

Level Fc. All 7 blades have the following general profile types: twisted – 71.4%, flat and incurvate distal – 14.3% each. The three complete blades have 66.6% of twisted type and 33.3% of incurvate distal type.
Level Fb1-Fb2. There are 105 definable blades with the following general profile types: twisted – 64.8%, incurvate medial – 22.9%, flat and incurvate distal – 5.7% each, convex – 0.9%. For 34 complete blades: 70.6% of twisted type, 20.6% of incurvate medial type, 5.9% of incurvate distal type and 2.9% of flat type.
Level Fa3. There are 25 definable blades with the following general profile types: twisted – 76%, incurvate medial – 12%, flat – 8% and convex – 4%. For 8 complete blades: 75% of twisted type and 12.5% of incurvate medial type and convex types each.
Level Fa1-Fa2. There are 10 definable blades with the following general profile types: twisted – 70%, convex – 20% and flat – 10%. For 6 complete blades: 66.6% of twisted type and 33.3% convex type.

These data show the great prevalence of twisted (64.8-76% for all definable blades and 66.6-75% for complete blades) over "regular" (flat, incurvate medial and incurvate distal) (10-34.3% for all definable blades and 0-33.3% for complete blades) general profile types of blades in all four levels of Unit F.

Profiles at Distal End. Data for the following analyses are based on the following numbers of definable blades from each level of Unit F: all 7 from level Fc, 57 from level Fb1-Fb2, 13 from level Fa3 and 7 from level Fa1-Fa2. The detailed data on their type representation are given below (see tabl. 18).

Level Fc: feathering – 71.4%, hinged and blunt – 14.3% each.
Level Fb1-Fb2: feathering – 63.2%, blunt – 29.8%, overpassed – 5.3% and hinged – 1.7%.
Level Fa3: feathering – 61.5%, blunt – 30.8% and hinged – 7.7%.
Level Fa1-Fa2: overpassed – 42.8%, feathering and blunt – 28.6% each.

Blades from three levels (Fc, Fb1-Fb2 and Fa3) show the dominance of feathering type – 61.5 – 71.4% with a poor representation of "not regular" (hinged and overpassed) types – 7-14.3%. On the other hand, the small sample of level Fa1-Fa2 shows a high proportion of "not regular" overpassed type – 42.8%.

Profiles at Midpoint. Data for these analyses were recorded from the following numbers of definable blades from each level of Unit F: all 7 from level Fc, all 111 from level Fb1-Fb2, all 30 from level Fa3 and all 13 from level Fa1-Fa2. Data on the range of types are represented below (see tabl. 19).

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
flat				
triangular	1		4	5 / 50%
trapezoidal			3	3 / 30%
multifaceted				
lateral steep		2		2 / 20%
crescent				
irregular				
unidentifiable				
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
flat	1			1 / 0.6%
triangular	7	14	43	64 / 37.4%
trapezoidal	10	1	39	50 / 29.2%
multifaceted	11	1	16	28 / 16.4%
lateral steep		12	12	24 / 14.0%
crescent	1		1	2 / 1.2%
irregular	2			2 / 1.2%
unidentifiable	5	11		16
N	37	39	11	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
flat				
triangular	1	4	6	11 / 25.6%
trapezoidal	2	1	16	19 / 44.2%
multifaceted	1		4	5 / 11.6%
lateral steep		4	2	6 / 14.0%
crescent				
irregular			2	2 / 4.6%
unidentifiable		2		2
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-c.pr.**	**blades-debitage**	**Blades Total**
flat				
triangular	1	2	7	10 / 52.6%
trapezoidal			5	5 / 26.3%
multifaceted			1	1 / 5.3%
lateral steep		1		1 / 5.3%
crescent				
irregular	1	1		2 / 10.5%
unidentifiable				
N	2	4	13	19

Table 19 - Siuren-I. Unit F. Blade Profiles at Midpoint as Percentages of Each Type.

Level Fc: triangular – 57.1% and trapezoidal – 42.9%.
Level Fb1-Fb2: triangular – 38.8%, trapezoidal – 35.1%, multifaceted – 14.4%, lateral steep – 10.8% and crescent – 0.9%.
Level Fa3: trapezoidal – 53.5%, triangular – 20.0%, multifaceted – 13.3%, lateral steep and irregular – 6.6% each.
Level Fa1-Fa2: triangular – 53.8%, trapezoidal – 38.5% and multifaceted – 7.7%.

The data above show the absolute dominance of three types (triangular, trapezoidal and multifaceted) – 86.8-88.3% in levels Fb1-Fb2 and Fa3, and 100% in both levels Fc and Fa1-Fa2. At the same time, the irregular type is rare and probably occasional, as it occurs only in level Fa3 (6.6%). Trapezoidal and multifaceted types, however, are of significant quantity – 42.9-49.5% in levels Fc, Fb1-Fb2 and Fa1-Fa2, 66.8% in level Fa3.

Butt Types. This analysis is based on the following numbers of definable blades' butts from each level of Unit F: 3 from level Fc, 66 from level Fb1-Fb2, 19 from level Fa3 and 10 from level Fa1-Fa2. Their type representation is represented below (see tabl. 20).

Level Fc: linear, crudely-faceted and crushed – 33.3% each.
Level Fb1-Fb2: plain – 27.3%, punctiform – 9.1%, linear – 22.7%, cortical – 1.5%, dihedral – 6.1%, crudely-faceted – 3%, finely-faceted – 1.5% and crushed – 28.8%.
Level Fa3: plain – 26.3%, punctiform and linear – 21% each, crushed – 31.7%.
Level Fa1-Fa2: plain, linear and dihedral – 20% each, crudely-faceted – 10% and crushed – 30%.

Definable blades' butts from levels Fc and Fa1-da2 are not suitable for any conclusions because of the small samples. The "plain-punctiform-linear" group of butt types is dominant in levels Fb1-Fb2 (59.1%) and Fa3 (68.3%), especially taking into account many crushed butts – 28.8% in level Fb1-Fb2 and

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
cortical				
plain	1	1		2 / 33.3%
punctiform				
linear			1	1 / 16.7%
dihedral				
crudly-faceted			1	1 / 16.7%
finely-faceted				
crushed		1	1	2 / 33.3%
missing			4	4
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
cortical		1	1	2 / 1.9%
plain	7	7	18	32 / 31.1%
punctiform	3	2	6	11 / 10.7%
linear	3	2	15	20 / 19.4%
dihedral		1	4	5 / 4.9%
crudly-faceted	1	1	2	4 / 3.9%
finely-faceted		2	1	3 / 2.9%
crushed	4	3	19	26 / 25.2%
missing	19	20	45	84
N	37	39	111	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
cortical				
plain		3	5	8 / 30.8%
punctiform			4	4 / 15.4%
linear	1	1	4	6 / 23.0%
dihedral				
crudly-faceted				
finely-faceted				
crushed		2	6	8 / 30.8%
missing	3	5	11	19
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
cortical				
plain		2	2	4 / 25.0%
punctiform				
linear			2	2 / 12.5%
dihedral	1		2	3 / 18.8%
crudly-faceted			1	1 / 6.2%
finely-faceted				
crushed	1	2	3	6 / 37.5%
missing			3	3
N	2	4	13	19

Table 20 - Siuren-I. Unit F. Blade Butt Types as Percentages of Each Type.

31.6% in level Fa3. Dihedral, crudely-faceted and finely-faceted types are characteristic for only one of ten butts (10.6% together) in level Fb1-Fb2, and are represented by 1-2 pieces in levels Fc and Fa1-Fa2 yet. Cortical type is noted for only a single butt in level Fb1-Fb2.

Lipping. The following numbers of blades' butts suitable for lipping identification from each level of Unit F were used: 2 in level Fc, 47 in level Fb1-Fb2, 9 in level Fa3 and 7 in level Fa1-Fa2. Their lipping characteristics are as follows (see tabl. 21).

Level Fc: semi-lipped – 100%.
Level Fb1-Fb2: semi-lipped – 89.4%, lipped – 6.4% and not lipped – 4.2%.
Level Fa3: semi-lipped – 88.8% and lipped – 11.1%.
Level Fa1-Fa2: semi-lipped – 71.4% and not lipped – 28.6%.

Thus, the semi-lipped type is the most typical blade butt type (71.4-100%), while lipped and not lipped butts are represented by 1-2 examples only each, if represented at all.

Butt Angle. The following numbers of blades' butts suitable for angle identification in each level of Unit F were used: 2 in level Fc, 47 in level Fb1-Fb2, 9 in level Fa3 and 7 in level Fa1-Fa2. Their angle characteristics are quoted below (see tabl. 22).

Level Fc: semi-acute and right – 50% each.
Level Fb1-Fb2: semi-acute – 66%, right – 25.5% and acute –

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
lipped				
semi-lipped		1	2	3 / 75%
not lipped	1			1 / 25%
unidentifiable		1	5	6
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
lipped			3	3 / 4%
semi-lipped	14	13	42	69 / 92%
not lipped		1	2	3 / 4%
unidentifiable	23	25	64	112
N	37	39	111	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
lipped			1	1 / 7.7%
semi-lipped	1	3	8	12 / 92.3%
not lipped				
unidentifiable	3	8	21	32
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
lipped				
semi-lipped	1	2	5	8 / 80%
not lipped			2	2 / 20%
unidentifiable	1	2	6	9
N	2	4	13	19

Table 21 - Siuren-I. Unit F. Blade Butt Lipping as Percentages of Each Type.

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
right	1	1	1	3 / 75%
semi-acute			1	1 / 25%
acute				
unidentifiable		1	5	6
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
right		6	12	18 / 24.0%
semi-acute	14	8	31	53 / 70.7%
acute			4	4 / 5.3%
unidentifiable	23	25	64	112
N	37	39	111	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
right			1	1 / 7.7%
semi-acute	1	1	7	9 / 69.2%
acute		2	1	3 / 23.1%
unidentifiable	3	8	21	32
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
right	1		2	3 / 30%
semi-acute		2	5	7 / 70%
acute				
unidentifiable	1	2	6	9
N	2	4	13	19

Table 22 - Siuren-I. Unit F. Blade Butt Angles as Percentages of Each Type.

8.5%.
Level Fa3: semi-acute – 77.7%, right and acute – 11.1% each.
Level Fa1-Fa2: semi-acute – 71.4% and right – 28.6% each.

Semi-acute angle is the most typical for blades' butts (66-77.7%) for the most representative samples of levels Fb1-Fb2 and Fa3. Right and acute angles are known by single pieces in levels Fc, Fa3 and Fa1-Fa2, but in the most abundant sample of level Fb1-Fb2, right angle prevails over acute angle in a 3:1 correlation.

Butt Abrasion. The following numbers of identifiable blades' butts for presence/absence of abrasion identification in four levels of Unit F were used: 2 from level Fc, 60 from level Fb1-Fb2, 13 from level Fa3 and 10 from level Fa1-Fa2. Their abrasion identifications are the following (see tabl. 23).

Level Fc	blades-tools	blades-CMP	blades-debitage	Blades Total
present	1			1 / 25%
absent		1	2	3 / 75%
unidentifiable		1	5	6
N	1	2	7	10
Level Fb1-Fb2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
present	13	7	41	61 / 67.8%
absent	1	9	19	29 / 32.2%
unidentifiable	23	23	51	97
N	37	39	111	187
Level Fa3	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
present	1	3	10	14 / 77.8%
absent		1	3	4 / 22.2%
unidentifiable	3	7	17	27
N	4	11	30	45
Level Fa1-Fa2	**blades-tools**	**blades-CMP**	**blades-debitage**	**Blades Total**
present			6	6 / 46.2%
absent	1	2	4	7 / 53.8%
unidentifiable	1	2	3	6
N	2	4	13	19

Table 23 - Siuren-I. Unit F. Blade Butt Abrasion as Percentages of Each Type.

Level Fc: absent – 100%.
Level Fb1-Fb2: present – 68.3% and absent – 31.7%.
Level Fa3: present – 76.9% and absent – 23.1%.
Level Fa1-Fa2: present – 60% and absent – 40%.

Aside from the two pieces of level Fc, blades of Unit F show a dominance of butts with abrasion (60-76.9%), although butts with no abrasion are also fairly well-represented (23.1-40%).

Metrics (Length, Width, Thickness) of Blades. Detailed metric data are mainly based on the analysis of complete blades from each level with some additional comparable information on broken blades.

Length. Given the rarity of complete blades in levels Fc, Fa3 and Fa1-Fa2 (less than 10 specimens in each level), the most informative blade sample is from level Fb1-Fb2.

Level Fb1-Fb2. There are two clusters of 34 complete blades in terms of length intervals: 2.1-4.5 cm – 73.6% and 5.1-5.5 cm – 17.6%, with a relative "metric gap" at 4.6-5.0 cm – only 5.9% (2 pieces) and a single blade (2.9%) with length more than 5.5 cm (6.1 cm). Mean length for blades is 4.0 cm. The following data on 77 broken blades can be noted – 72.8% are in the 0.5-3.0 cm interval and only one fragment (1.3%) exceeds 6.0 cm (7.7 cm).
Level Fc. Three complete blades have the following length: 2.1 – 3.3 – 3.5 cm. Accordingly, mean length is only 3.0 cm. Four broken blades are all in the interval 2.0-3.5 cm
Level Fa3. As in level Fb1-Fb2, there are again two clusters of complete blades (8 pieces) in terms of length: 2.5-4.0 cm – 62.5% (5 pieces) and 4.6-5.0 cm – 25% (2 pieces), with none in the 4.1-4.5 cm interval and the presence of just one blade (12.5%) which exceeds 5.0 cm (6.4 cm). Mean length is 4.2 cm. 86.4% of 22 broken blades are in the 1.1-3.0 cm interval and no blade is longer than 5.0 cm.
Level Fa1-Fa2. Five (83.3%) of 6 complete blades are in the 2.5-4.5 cm interval and one blade (16.7%) is 5.3 cm long. Mean length is 3.8 cm. Six (85.7%) of 7 broken blades are in the 1.1-4.0 cm interval and one fragment (14.3%) is 5.5 cm long.

Blades of Unit F are thus rather short with mean data for the four levels between 3.0 and 4.2 cm with a very probable real mean index of 4.0 cm as this comes from the richest sample of level Fb1-Fb2. No complete blade is longer than 6.5 cm. Moreover, most complete blades do not exceed 4.5 cm in length.

Width. The following width distribution of complete blades is observed: level Fc – 1.2-1.5 cm – 66.7%, 1.6-2.0 cm – 33.3%; level Fb1-Fb2 – 1.2-1.5 cm – 64.7%, 1.6-2.0 cm – 26.5%, 2.1-2.5 cm – 8.8%; level Fa3 – 1.2-1.5 cm – 50%, 1.6-2.0 cm – 37.5%, 2.1-2.5 cm – 12.5%; level Fa1-Fa2 – 1.2-1.5 cm – 50%, 1.6-2.0 cm – 33.3%, 2.1-2.5 cm – 16.7%. No blade is wider than 2.5 cm. Mean width for complete blades are as follows: 1.5 cm for level Fc, Fb1-Fb2 and Fa1-Fa2 and 1.6 cm for level Fa3.

The width data for broken blades of all four levels are similar to complete blades, but with somewhat more wider pieces: level Fc – 1.2-1.5 cm – 50%, 1.6-2.0 cm – 25%, 2.1-2.5 cm – none, > 2.5 cm – just a single piece (25%) of 2.7 cm; level Fb1-Fb2 – 1.2-1.5 cm – 67.5%, 1.6-2.0 cm – 24.7%, 2.1-2.5 cm – 2.6%, 2.6-3.0 cm – 3.9%, 3.1-3.5 cm – 1.3%; level Fa3 – 1.2-1.5 cm – 63.7%, 1.6-2.0 cm – 22.7%, 2.1-2.5 cm – 13.6%; level Fa1-Fa2 – 1.2-1.5 cm – 57.2%, 1.6-2.0 cm – 42.8%. Five of 110 broken blades (4.5%) have width greater than 2.5 cm in the 2.5-3.5 cm interval. But, at the same time, mean indices, aside from level Fc, remained the same – 1.8 cm for level Fc and 1.5 cm for levels Fb1-Fb2, Fa3 and Fa1-Fa2.

Overall, width data for all complete and broken blades together are as follows: 1.2-1.5 cm – 57.1% for level Fc, 66.7% for level Fb1-Fb2, 60% for level Fa3 and 53.8% for level Fa1-Fa2; 1.6-2.0 cm – 28.6% for level Fc, 25.2% for level Fb1-Fb2, 26.7% for level Fa3 and 38.5% for level Fa1-Fa2; 2.1-2.5 cm – none for level Fc, 4.5% for level Fb1-Fb2, 13.3% for level Fa3 and 7.7% for level Fa1-Fa2; 2.6-3.0 cm – 14.3% for level Fc and 2.7% for level

Level Fc	bladelets-tools	bladelets-CMP	bladelets-debitage	Bladelets Total
cortical				
dorsal-plain				
lateral				
crested				
unidirectional			7	7 / 87.5%
unidirectional-crossed			1	1 / 12.5%
bidirectional				
3-directional				
centripetal				
core tablet				
unidentifiable				
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
cortical				
dorsal-plain				
lateral				
crested		39		39 / 9.7%
unidirectional	6		274	280 / 69.5%
unidirectional-crossed			56	56 / 13.9%
bidirectional			28	28 / 6.9%
3-directional				
centripetal				
core tablet		1		1
unidentifiable				
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
cortical				
dorsal-plain				
lateral				
crested		6		6 / 9.8%
unidirectional			48	48 / 78.7%
unidirectional-crossed			4	4 / 6.6%
bidirectional			2	2 / 3.3%
3-directional			1	1 / 1.6%
centripetal				
core tablet				
unidentifiable				
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
cortical				
dorsal-plain				
lateral			1	1 / 2.7%
crested		4		4 / 10.8%
unidirectional	1		26	27 / 73.0%
unidirectional-crossed			5	5 / 13.5%
bidirectional				
3-directional				
centripetal				
core tablet				
unidentifiable				
N	1	4	32	37

Table 24 - Siuren-I. Unit F. Bladelet Dorsal Scar Patterns as Percentages of Each Type.

Fb1-Fb2; 3.1-3.5 cm – only 0.9% for level Fb1-Fb2. Mean indices: 1.7 cm for level Fc, 1.6 cm for level Fa3 and 1.5 cm for both levels Fb1-Fb2 and Fa1-Fa2. Given the most abundant blade sample from level Fb1-Fb2, this level is more representative. There is a great dominance of really narrow blades with width 1.2-1.5 cm (66.7%), while blades with width more than 2.5 cm are extremely rare (3.6%). Mean width indices for both complete and broken blades of 1.5 cm again confirm this interval's data.

Thickness. These data are also given separately for complete and broken blades and then for both samples together from each level of Unit F.

Complete blades have the following mean thickness indications: 0.4 cm for both levels Fc and Fb1-Fb2, 0.5 cm for level Fa3 and 0.6 cm for level Fa1-Fa2. Broken blades are characterized by the following mean thickness indices: 0.4 cm for 3 levels – Fc, Fb1-Fb2 and Fa1-Fa2, and 0.3 cm for level Fa3. overall, mean thickness index for three levels (Fc, Fb1-Fb2, Fa3) is 0.4 cm and mean thickness index for level Fa1-Fa2 is 0.5 cm. According to these mean data, the most typical thickness interval is 0.1-0.5 cm – 66.6% for complete and 75% for broken blades in level Fc, 76.5% for complete and 93.5% for broken blades in level Fb1-Fb2, 95.5% for complete and 86.7% for broken blades in level Fa3, 50% for complete and 100% for broken blades in level Fa1-Fa2. At the same time, only a single blade from level Fb1-Fb2 has thickness more than 1.0 cm (1.2 cm) among all 161 blades (0.6%) of Unit F. So, blades are rather thin in Unit F.

Butt Sizes. Given the rarity of definable butts for this analysis in levels Fc (2 items), Fa3 (9 items) and Fa1-Fa2 (7 items), the important data come only from level Fb1-Fb2 (41 items) which should be regarded as a significant level for any technological analysis.

Mean metric data for blades' butts are represented below. Butt width: 0.6 cm for level Fb1-Fb2, 0.5 cm for level Fa3, 0.7 cm for level Fa1-Fa2 and 0.5 and 0.9 cm for the two pieces in level Fc. Butt height: 0.2 cm for both levels Fb1-Fb2 and Fa3, 0.3 cm for level Fa1-Fa2, and 0.1 and 0.2 cm for the two pieces in level Fc. Plain butts have the following width – 0.8 cm for level Fb1-Fb2 (18 pieces), 0.6 cm for level Fa3 (5 pieces) and 0.7 and 0.6 cm for the two pieces in level Fa1-Fa2 and have the following height – 0.4 cm for level Fb1-Fb2, 0.2 cm for level Fa3 and 0.2 cm each for the two pieces in level Fa1-Fa2. Level Fc does not contain any blade with plain butt.

Thus, the blades of the four levels of Unit F should be better considered on the basis of the most abundant sample from level Fb1-Fb2. They can be generally characterized by:

- a dominance of unidirectional scar pattern (70%), a subordinate position of unidirectional-crossed scar pattern (20%) and a rare representation of bidirectional, lateral and dorsal-plain scar patterns;
- a prevalence of non-cortical pieces (76.6%) over partially cortical pieces with no representation of wholly cortical items, as well as an absolute dominance of lateral cortex (81.8%) for partially cortical pieces which mostly have significant cortex (63.6%);
- a correlation between parallel and converging shape types (79.8% together) and "on-axis" type of removal direction (80%);
- a great prevalence of twisted type of general profile (64.8%) over "regular" (flat, incurvate medial and incurvate distal) types of general profiles (34.3% together);
- a dominance of feathering distal end (63.2%) with a poor representation of "not regular" (hinged and overpassed) types (7% together);
- a great dominance of triangular, trapezoidal and multifaceted profiles at midpoint (88.3%) where the latter two comprise a significant, but not prevailing position – 49.5%;
- a dominance of the "plain-punctiform-linear" group of butt types (59.1%) with a notable presence (10.6%) of dihedral and faceted butts;
- a great dominance of semi-lipped butts (89.4%) with mainly semi-acute angle (66%) and a moderate number of right angle (25.5%), a low number of both lipped butts (6.4%) with acute angle (8.5%) and not lipped butts (4.2%) with right angle (some of 25.5%);
- twice as many butts with abrasion (68.3%) over butts with no abrasion (31.7%);
- a dominance of rather short (mean index in 4.0 cm), narrow (mean index in 1.5 cm) and overall thin (0.4 cm mean) blades.

Bladelets

Bladelets are poorly represented in levels Fc, Fa3 and Fa1-Fa2, especially in comparison to their large quantity in level Fb1-Fb2. Therefore, main morphological and technological information and conclusions should be drawn on the basis of the sample from the latter level, although all descriptions of bladelets are given below for each of the four levels. In terms of condition, bladelets from the four levels of Unit F are subdivided into complete and broken pieces, with further distribution of the latter specimens into proximal, medial and distal fragments.

8 bladelets of level Fc consist of a single complete piece (12.5%) and 7 broken pieces (87.5%) – 2 proximal (25%), a medial (12.5%) and 4 distal (50%).

358 bladelets of level Fb1-Fb2 consist of 131 complete pieces (36.6%) and 227 broken pieces (63.4%) – 101 proximal (28.2%), 48 medial (13.4%) and 78 distal (21.8%).

55 bladelets of level Fa3 consist of 12 complete pieces (21.8%) and 43 broken pieces (78.2%) – 21 proximal (38.2%), 18 medial (32.7%) and 4 distal (7.3%).

32 bladelets of level Fa1-Fa2 consist of 5 complete pieces (15.6%) and 27 broken pieces (84.4%) – 14 proximal (43.8%), 7 medial (21.9%) and 6 distal (18.7%).

Dorsal Scar Pattern. Two scar pattern types have been identified on all 8 bladelets from level Fc, three on all 358 bladelets from level Fb1-Fb2 and all 32 bladelets from level Fa1-Fa2 and four scar pattern types on all 55 bladelets from level Fa3.

Separately, bladelets from each level have the following scar pattern type representations (see tabl. 24).

Bladelets of level Fc: unidirectional – 87.5% and unidirectional-crossed – 12.5%.
Bladelets of level Fb1-Fb2: unidirectional – 76.6%, unidirectional-crossed – 15.6% and bidirectional – 7.8%.
Bladelets of level Fa3: unidirectional – 87.3%, unidirectional-crossed – 7.3%, bidirectional – 3.6% and 3-directional – 1.8%.
Bladelets of level Fa1-Fa2: unidirectional – 81.3%, unidirectional-crossed – 15.6% and lateral – 3.1%.

Thus, there is a great dominance of unidirectional scar pattern (76.6-87.5%), a moderate representation of unidirectional-crossed scar pattern (12.5-15.6% in levels Fc, Fb1-Fb2 and

Level Fc	bladelets-tools	bladelets-CMP	bladelets-debitage	Bladelets Total
parallel			6	6 / 75%
converging				
expanding			2	2 / 25%
ovoid				
irregular				
unidentifiable				
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
parallel	2	2	88	92 / 36.8%
converging	1	20	80	101 / 40.4%
expanding	1	4	30	35 / 14.0%
ovoid			4	4 / 1.6%
irregular		7	11	18 / 7.2%
unidentifiable	2	7	145	154
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
parallel			26	26 / 57.8%
converging		2	9	11 / 24.4%
expanding		2	3	5 / 11.1%
ovoid				
irregular		2	1	3 / 6.7%
unidentifiable			16	16
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
parallel		1	14	15 / 50%
converging			3	3 / 10%
expanding	1	2		3 / 10%
ovoid				
irregular			9	9 / 30%
unidentifiable		1	6	7
N	1	4	32	37

Table 25 - Siuren-I. Unit F. Bladelet Shapes as Percentages of Each Type.

Fa1-Fa2 and 7.3% in level Fa3), a subordinate position of bidirectional scar pattern (3.6-7.8% in the largest samples of levels Fa3 and Fb1-Fb2, and none in the poor samples of levels Fc and Fa1-Fa2), while the presence of 3-directional and lateral scar patterns certainly seems to be occasional as they are known only on a single piece each from levels Fa3 and Fa1-Fa2.

Comparison of scar pattern types with presence/absence of cortex on bladelets shows a much greater proportion of partially cortical pieces among "non-unidirectional" bladelets in comparison to the proportion among unidirectional bladelets. In level Fb1-Fb2, pieces with some primary cortex comprise only 5.8% among unidirectional bladelets, while unidirectional-crossed and bidirectional bladelets include pieces with some cortex (14.2% and 17.9% respectively). Moreover, in level Fa3 all bidirectional (2 items) and 3-directional (1 item) pieces (100%) have some cortex, as well as 50% of unidirectional-crossed bladelets (2 pieces), while only a single piece (2.1%) among unidirectional bladelets is partially cortical. A single lateral bladelet in level Fa1-Fa2 is also partially cortical (100%). On the other hand, unidirectional bladelets in level Fa1-Fa2 and Fc have some cortex only in 11.5% and 14.3% of the cases. So, the data additionally point out auxiliary and preparatory roles of "non-unidirectional" bladelets in primary reduction processes of the Unit F lithic industries.

Surface Cortex Area and Location. All bladelets from each level of Unit F were used for surface cortex area identification. Non-cortical bladelets comprise more than 7/8 of all bladelets: 87.5% in levels Fc and Fa1-Fa2, 91.9% in level Fb1-Fb2 and 89.1% in level Fa3. Wholly cortical bladelets are completely absent. Partially cortical pieces comprise the following percentages: 12.5% in levels Fc and Fa1-Fa2, 8.1% in level Fb1-Fb2 and 10.9% in level Fa3. Taken separately, complete bladelets show the following cortex data: level Fc – a single complete piece is non-cortical (100%); level Fb1-Fb2 (131 pieces) – non-cortical (89.4%) and partially cortical (10.6%); level Fa3 (12 pieces) – non-cortical (83.3%) and partially cortical (16.7%); level Fa1-Fa2 (5 pieces) – non-cortical (80%) and partially cortical (20%, a single piece). Complete partially cortical bladelets also allow us to see an interval subdivision into pieces with significant cortex – 28.6% (4 pieces) in level Fb1-Fb2, 100% (both pieces) in level Fa3 and 100% (a single piece) in level Fa1-Fa2, and pieces with insignificant cortex – 71.4% (10 pieces) in level Fb1-Fb2 and none in levels Fa3 and Fa1-Fa2.

Data on surface cortex location for complete partially cortical bladelets are given below. All 3 pieces from levels Fa3 and Fa1-Fa2 have only lateral cortex. Fourteen pieces of level Fb1-Fb2 have the following cortex location: lateral – 50% (7 items), distal – 42.9% (6 pieces) and central – 7.1% (1 piece).

Shape. The following numbers of bladelets with definable shapes were used from each level of Unit F: all 8 pieces of level Fc, 213 pieces of level Fb1-Fb2, 39 pieces of level Fa3 and 26 pieces of level Fa1-Fa2. They are characterized by the following shape types (see tabl. 25).

Level Fc: parallel – 75% and expanding – 25% (a single piece).
Level Fb1-Fb2: parallel – 41.3%, converging – 37.5%, expanding – 14.1%, irregular – 5.2%, ovoid – 1.9%.
Level Fa3: parallel – 66.6%, converging – 23.1%, expanding – 7.7%, irregular – 2.6%.
Level Fa1-Fa2: parallel – 53.9%, irregular – 34.6%, converging – 11.5%.

Parallel shape is the dominant type for bladelets in all four levels (41.3-75%), which additionally in conjunction with converging type constitute more than three fourths of all bladelets in levels Fb1-Fb2 (78.8%) and Fa3 (89.7%). Expanding and irregular shape types are characteristic for relatively few bladelets in levels Fb1-Fb2 (19.3%) and Fa3 (10.3%). Only level Fa1-Fa2 shows a significant percentage of bladelets with irregular shape (34.6%), although there are only 9 pieces.

Axis. The following numbers of bladelets with definable axis of removal directions were used from each level of Unit F: all 8 pieces in level Fc, 332 pieces in level Fb1-Fb2, 49 pieces in level Fa3 and 28 pieces in level Fa1-Fa2 (see tabl. 26).

Three levels with a small number of bladelets are characterized by the significant prevalence of "on-axis" type (87.5% in level Fc, 79.6% in level Fa3 and 64.3% in level Fa1-Fa2) over "off-axis" type (12.5% in level Fc, 20.4% in level Fa3 and 35.7% in level Fa1-Fa2). On the other hand, the largest bladelet sample from level Fb1-Fb2 shows only a very minor predominance of "on-axis" type (53%) over "off-axis" type (47%). Taking into account these proportions in the lattermost representative level, these data should serve as the most objective ones for axis of removal directions for bladelets in the Unit F lithic industry.

General Profiles. These data are based on separate analysis of all definable bladelets (see tabl. 27) and only complete bladelets.

Level Fc. All 8 bladelets have the following general profile types: twisted – 50%, flat – 25%, incurvate medial and incurvate distal – 12.5% each. A single complete bladelet has twisted general profile.
Level Fb1-Fb2. There are 335 definable bladelets with the following general profile types: twisted – 73.2%, incurvate medial – 14.3%, flat – 8.9%, incurvate distal and convex – 1.8% each. For 131 complete bladelets there are recognized 80.9% of twisted type, 12.2% of incurvate medial type, 6.1% of flat type, 0.8% of incurvate distal type (a single piece) and none for convex type.
Level Fa3. There are 53 definable bladelets with the following general profile types: twisted – 73.6%, incurvate medial – 15.1% and flat – 11.3%. For 12 complete bladelets there are recognized 75% of twisted type, 16.7% of incurvate medial type (2 items) and 8.3% of flat type (a sole piece).
Level Fa1-Fa2. There are 31 definable bladelets with the following general profile types: twisted – 77.5%, incurvate medial – 16.1%, flat and convex – 3.2% each. For 5 complete bladelets there are 80% of twisted type and 20% of incurvate medial type (1 item only).

These data show that about three quarters of all bladelets have twisted profiles in levels Fb1-Fb2, Fa3 and Fa1-fa2 (73.2 – 77.5%), about three to four times more numerous than "regular" (flat, incurvate medial and incurvate distal) types in these levels (19.3-26.4%). Data on complete bladelets only make the observed twisted type prevalence more evident as well – 75-80.9 versus 19.1-25%.

Profiles at Distal End. Data for the following analysis were based on the following numbers of definable bladelets from each level

Level Fc	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
on-axis			7	7 / 87.5%
off-axis			1	1 / 12.5%
unidentifiable				
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
on-axis	3	10	176	189 / 51.4%
off-axis	2	21	156	179 / 48.6%
unidentifiable	1	9	26	36
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
on-axis		1	39	40 / 72.7%
off-axis		5	10	15 / 27.3%
unidentifiable			6	6
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
on-axis		2	18	20 / 62.5%
off-axis	1	1	10	12 / 37.5%
unidentifiable		1	4	5
N	1	4	32	37

Table 26 - Siuren-I. Unit F. Bladelet Axis as Percentages of Each Type.

Level Fc	bladelets-tools	bladelets-CMP	bladelets-debitage	Bladelets Total
flat			2	2 / 25%
incurvate medial			1	1 / 12.5%
incurvate distal			1	1 / 12.5%
convex				
twisted			4	4 / 50%
unidentifiable				
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
flat		2	30	32 / 8.5%
incurvate medial	2	9	48	59 / 15.7%
incurvate distal		2	6	8 / 2.1%
convex			6	6 / 1.6%
twisted	4	22	245	271 / 72.1%
unidentifiable		5	23	28
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
flat			6	6 / 10.2%
incurvate medial		1	8	9 / 15.2%
incurvate distal				
convex				
twisted		5	39	44 / 74.6%
unidentifiable			2	2
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
flat			1	1 / 2.9%
incurvate medial			5	5 / 14.2%
incurvate distal				
convex			1	1 / 2.9%
twisted	1	3	24	28 / 80.0%
unidentifiable		1	1	2
N	1	4	32	37

Table 27 - Siuren-I. Unit F. Bladelet General Profiles as Percentages of Each Type.

of Unit F: 5 from level Fc, 209 from level Fb1-Fb2, 17 from level Fa3 and 11 from level Fa1-Fa2. Data on their type representation are given below (see tabl. 28).

Level Fc: feathering – 80% and blunt – 20% (a single piece).
Level Fb1-Fb2: feathering – 66%, blunt – 15.8%, hinged – 12.9% and overpassed – 5.3%.
Level Fa3: feathering – 82.4% and blunt – 17.6% (3 pieces).
Level Fa1-Fa2: feathering – 81.8% and blunt – 18.2% (2 pieces).

Three levels (Fc, Fa3 and Fa1-Fa2) with a limited number of bladelets with definable distal ends are characterized by only two types – a very dominant feathering one (80-82.4%) and a subordinate blunt one (17.6-20%). On the other hand, bladelets in level Fb1-Fb2 are characterized by all five profiles of distal end types with feathering (66%) still dominant and a moderate number of "not regular" (hinged and overpassed) types – 18.2% together.

Profiles at Midpoint. Data for this analysis are recorded on all bladelets from each level of Unit F. Data on the range of types are represented below (see tabl. 29).

Level Fc: triangular – 75% and trapezoidal – 25% (2 pieces).
Level Fb1-Fb2: trapezoidal – 43.3%, triangular – 31.6%, multifaceted – 16.7%, lateral steep – 8.1%, flat – 0.3%.
Level Fa3: trapezoidal – 45.5%, triangular – 38.2%, multifaceted – 10.9%, lateral steep – 5.4%.
Level Fa1-Fa2: trapezoidal – 59.5%, triangular – 28.1%, multifaceted and lateral steep – 6.2% each.

Thus, aside from the poorest bladelet sample from level Fc, bladelets from the other three levels (Fb1-Fb2, Fa3 and Fa1-Fa2) show the dominant position of trapezoidal type alone in the each level (43.3-59.5%). Moreover, trapezoidal and multifaceted types together make up almost two-thirds of all bladelets – 56.4-65.7%. Three main types together (triangular, trapezoidal, multifaceted) absolutely dominate (91.6-94.6%), while irregular type of profile at midpoint is completely unknown.

Butt Types. This analysis is based on the following numbers of definable bladelet butts from each level of Unit F: 3 from level Fc, 231 from level Fb1-Fb2, 33 from level Fa3 and 19 from level Fa1-Fa2. Their type representation is listed below (see tabl. 30).

Level Fc: linear – 66.6% (2 pieces) and crushed – 33.3% (1 piece).
Level Fb1-Fb2: plain – 12.1%, punctiform – 3.9%, linear – 49.4%, dihedral – 2.6%, crudely-faceted – 0.4% (1 piece) and crushed – 31.6%.

Level Fc	bladelets-tools	bladelets-CMP	bladelets-debitage	Bladelets Total
feathering			4	4 / 80%
hinged				
overpassed				
blunt			1	1 / 20%
unidentifiable			3	3
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
feathering		28	138	166 / 68.9%
hinged			27	27 / 11.2%
overpassed		1	11	12 / 5.0%
blunt		3	33	36 / 14.9%
unidentifiable	6	8	149	163
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
feathering		5	14	19 / 82.6%
hinged		1		1 / 4.3%
overpassed				
blunt			3	3 / 13.1%
unidentifiable			38	38
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
feathering		3	9	12 / 85.7%
hinged				
overpassed				
blunt			2	2 / 14.3%
unidentifiable	1	1	21	23
N	1	4	32	37

Table 28 - Siuren-I. Unit F. Profiles at Distal End as Percentages of Each Type.

Level Fa3: plain and punctiform – 6.1% each, linear – 51.4%, dihedral – 9.1% and crushed – 27.3%.
Level Fa1-Fa2: linear – 36.8%, punctiform and finely-faceted – 5.3% each (1 piece each), dihedral – 10.5% and crushed – 42.1%.

Linear butt type is the most common in all four levels – 36.8-66.6%. Overall, the "plain-punctiform-linear" group of butt types is of great importance excluding crushed butt type (27.3-31.6%) – 63.6-65.4% in levels Fb1-Fb2 and Fa3 where all three types are represented. At the same time, other butt types (dihedral and faceted) are noted for only several pieces.

Lipping. The following numbers of bladelet butts suitable for lipping identification in each level of Unit F are used: 2 in level Fc, 158 in level Fb1-Fb2, 23 in level Fa3 and 11 in level Fa1-Fa2. Their lipping characteristics are as follows (see tabl. 31).

Level Fc: semi-lipped – 100%.
Level Fb1-Fb2: semi-lipped – 75.4%, lipped – 24% and not lipped – 0.6%.
Level Fa3: semi-lipped – 87% and lipped – 13%.
Level Fa1-Fa2: semi-lipped – 81.8%, lipped and not lipped – 9.1% (1 piece each).

The great dominance of semi-lipped butts (75.4-100%) can be observed, the subordinate position of lipped butts (9.1-24%) and the occasional occurrence of not lipped butts represented by single pieces only in levels Fb1-Fb2 and Fa1-Fa2.

Butt Angle. The following numbers of bladelet butts suitable for angle identification in each level of Unit F are used: 2 in level Fc, 158 in level Fb1-Fb2, 23 in level Fa3 and 11 in level Fa1-Fa2 with data presented below (see tabl. 32).

Level Fc: semi-acute – 100%.
Level Fb1-Fb2: semi-acute – 86.7%, acute – 10.1% and right – 3.2%.
Level Fa3: semi-acute – 95.7% and acute – 4.3%.
Level Fa1-Fa2: semi-acute – 90.9% and right – 9.1%.

Semi-acute angle is the most common – 86.7-100%. Acute and right angles are represented only by single pieces in levels Fa3 and Fa1-Fa2, while acute angle prevails over right angle in level Fb1-Fb2in the following proportion: 3.2:1.

Butt Abrasion. The following numbers of identifiable bladelet butts for the presence/absence of abrasion are used in the four levels of Unit F: 3 from level Fc, 231 from level Fb1-Fb2, 32 from level Fa3 and 17 from level Fa1-Fa2. Abrasion data are as follows (see tabl. 33).

Level Fc: present – 100%; Level Fb1-Fb2: present – 95.2% and absent – 4.8%; Level Fa3: present – 93.8% and absent – 6.2%; Level Fa1-Fa2: present – 88.2% and absent – 11.8%.

Nearly all bladelets have butts with abrasion (88.2-100%). Butts with no abrasion are certainly rare;, for example, in the largest sample from level Fb1-Fb2, for one butt with no abrasion there are 20 butts with abrasion.

Level Fc	bladelets-tools	bladelets-CMP	bladelets-debitage	Bladelets Total
flat				
triangular			6	6 / 75%
trapezoidal			2	2 / 25%
multifaceted				
lateral steep				
crescent				
irregular				
unidentifiable				
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
flat			1	1 / 0.2%
triangular	1	23	113	137 / 34.0%
trapezoidal	2	5	155	162 / 40.3%
multifaceted	3		60	63 / 15.6%
lateral steep		11	29	40 / 9.9%
crescent				
irregular				
unidentifiable		1		1
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
flat				
triangular		3	21	24 / 39.4%
trapezoidal		1	25	26 / 42.6%
multifaceted			6	6 / 9.8%
lateral steep		2	3	5 / 8.2%
crescent				
irregular				
unidentifiable				
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
flat				
triangular		1	9	10 / 27.0%
trapezoidal			19	19 / 51.4%
multifaceted	1		2	3 / 8.1%
lateral steep		3	2	5 / 13.5%
crescent				
irregular				
unidentifiable				
N	1	4	32	37

Table 29 - Siuren-I. Unit F. Bladelet Profiles at Midpoint as Percentages of Each Type.

Metrics (Length, Width, Thickness) of Bladelets. Detailed metric data are mainly based on the analysis of complete bladelets from each level with some additional comparable information on broken bladelets.

Length. The main source for length data is the analysis of bladelets from level Fb1-Fb2 as the number of complete bladelets in the other three levels is very low: 1, 12 and 5 pieces.

There is a great dominance of "short" complete bladelets with length no more than 3.0 cm: 1 piece/100% in level Fc, 120 pieces/91.6% in level Fb1-Fb2, 10 pieces/83.4% in level Fa3 and 5 pieces/100% in level Fa1-Fa2. Accordingly, "long" bladelets (with length more than 3.0 cm) account for a very low number of pieces – only 11 pieces/8.4% in level Fb1-Fb2 and 2 pieces/16.6% in level Fa3. There are no complete bladelets with length more than 5 cm. The longest bladelets in Unit F are as follows: 3.7 cm, 4.1 cm and 4.3 cm in level Fb1-Fb2, and 3.4 cm and 3.7 cm in level Fa3. The shortest bladelets: 1.7 cm in level Fc, 1.4 cm in level Fb1-Fb2, 1.7 cm in level Fa3 and 1.9 cm in level Fa1-Fa2. Mean length for complete bladelets from the four levels: 2.3 cm in levels Fb1-Fb2 and Fa1-Fa2, 2.5 cm for level Fa3. Number of broken bladelets with length more than 3 cm: 1 piece/14.3% in level Fc, 8 pieces/3.5% in level Fb1-Fb2, 2 pieces/4.6% in level Fa3 and none in level Fa1-Fa2. The longest broken bladelets: 4.0 cm in level Fc, 3.6 cm and 4.1 cm in level Fb1-Fb2, 3.1 and 3.2 cm in level Fa3 and 3.0 cm in level Fa1-Fa2. At the same time, there is also a moderate number of broken bladelets in the length interval 2.1-3.0 cm – 4 pieces/57.1% in level Fc, 37 pieces/16.3% in level Fb1-Fb2, 10 pieces/23.2% in level Fa3 and 6 pieces/22.2% in level Fa1-Fa2.

Bladelets in Unit F are most typically of "short" length with just a few pieces with length more than 3.0 cm, confirmed by mean indices of 2.3 and 2.5 cm.

Width. The following width distribution of complete bladelets is noted: level Fc – 0.7-0.9 cm (0.8 cm) – 1 piece/100%; le-

Level Fc	bladelets-tools	bladelets-CMP	bladelets-debitage	Bladelets Total
cortical				
plain				
punctiform				
linear			2	2 / 66.6%
dihedral				
crudly-faceted				
finely-faceted				
crushed			1	1 / 33.3%
missing			5	5
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
cortical		1		1 / 0.4%
plain	1	1	28	30 / 11.3%
punctiform	1	10	9	20 / 7.5%
linear	2	9	114	125 / 47.0%
dihedral		1	6	7 / 2.6%
crudly-faceted		1	1	2 / 0.7%
finely-faceted				
crushed		8	73	81 / 30.5%
missing	2	9	127	138
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
cortical		1		1 / 2.7%
plain		2	2	4 / 10.8%
punctiform			2	2 / 5.4%
linear		1	17	18 / 48.7%
dihedral			3	3 / 8.1%
crudly-faceted				
finely-faceted				
crushed			9	9 / 24.3%
missing		2	22	24
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
cortical				
plain				
punctiform			1	1 / 4.2%
linear	1	1	7	9 / 37.5%
dihedral			2	2 / 8.3%
crudly-faceted		1		1 / 4.2%
finely-faceted			1	1 / 4.2%
crushed		2	8	10 / 41.6%
missing			13	13
N	1	4	32	37

Table 30 - Siuren-I. Unit F. Bladelet Butt Types as Percentages of Each Type.

vel Fb1-Fb2 – 0.7-0.9 cm – 90 pieces/68.7%, 1.0-1.1 cm – 41 pieces/31.3%; level Fa3 – 0.7-0.9 cm – 9 pieces/75%, 1.0-1.1 cm – 3 pieces/25%; level Fa1-Fa2 – 0.7-0.9 cm – 4 pieces/80%, 1.0-1.1 cm – 1 piece/20%. Width of broken bladelets is very similar to complete bladelets: level Fc – 0.7-0.9 cm – 6 pieces/85.7%, 1.0-1.1 cm – 1 piece/14.3%; level Fb1-Fb2 – 0.7-0.9 cm – 149 pieces/65.6%, 1.0-1.1 cm – 78 pieces/34.4%; level Fa3 – 0.7-0.9 cm – 32 pieces/74.4%, 1.0-1.1 cm – 11 pieces/25.6%; level Fa1-Fa2 – 0.7-0.9 cm – 20 pieces/74.1%, 1.0-1.1 cm – 7 pieces/25.9%.

Mean width for both complete and broken bladelets, as well as mean indices for all bladelets from three levels of Unit F (Fb1-Fb2, Fa3 and Fa1-Fa2), is identical – 0.9 cm. The limited bladelet sample in level Fc shows mean width of 0.8 cm. There is thus a dominance of "medium" width for bladelets.

Thickness. Mean thickness is 0.2 cm for all bladelet categories (complete, broken and all together) in all four levels of Unit F. Aside from 4 pieces with thickness of 0.5 cm in level Fb1-Fb2 and 2 pieces with thickness of 0.5 cm in level Fa3, all other bladelets (447 items from all four levels together) have thickness in the 0.1-0.4 cm interval.

Thus, bladelets of Unit F are quite thin.

Butt Sizes. Mean metric data for bladelet butts are similar in the four levels of Unit F. Butt width: 0.4 cm for levels Fb1-Fb2 (150 butts) and Fa1-fa2 (10 butts), 0.3 cm for level Fa3 (22 butts). Two identifiable butts in level Fc have width of 0.2 and 0.3 cm.

Level Fc	bladelets-tools	bladelets-CMP	bladelets-debitage	Bladelets Total
lipped				
semi-lipped			2	2 / 100%
not lipped				
unidentifiable			6	6
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
lipped			38	38 / 21.2%
semi-lipped	4	17	119	140 / 78.2%
not lipped			1	1 / 0.6%
unidentifiable	2	23	200	225
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
lipped			3	3 / 11.5%
semi-lipped		3	20	23 / 88.5%
not lipped				
unidentifiable		3	32	35
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
lipped			1	1 / 7.7%
semi-lipped	1	1	9	11 / 84.6%
not lipped			1	1 / 7.7%
unidentifiable		3	21	24
N	1	4	32	37

Table 31 - Siuren-I. Unit F. Bladelet Butt Lipping as Percentages of Each Type.

Level Fc	bladelets-tools	bladelets-CMP	bladelets-debitage	Bladelets Total
right				
semi-acute			2	2 / 100%
acute				
unidentifiable			6	6
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
right	1	1	5	7 / 3.9%
semi-acute	3	16	137	156 / 87.2%
acute			16	16 / 8.9%
unidentifiable	2	23	200	225
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
right				
semi-acute		3	22	25 / 96.2%
acute			1	1 / 3.8%
unidentifiable		3	32	35
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
right		1	1	2 / 15.4%
semi-acute	1		10	11 / 84.6%
acute				
unidentifiable		3	21	24
N	1	4	32	37

Table 32 - Siuren-I. Level Fc. Bladelet Butt Angles as Percentages of Each Type.

Butt height: 0.1 cm for all four levels, including 2 butts from level Fc of 0.1 cm each. Plain butts have the following dimensions in level Fb1-Fb2 – 0.5 cm mean width and 0.2 cm mean height for 28 butts. Level Fa3 has only 2 plain butts for bladelets with widths of 0.4 cm and 0.5 cm and height of 0.2 cm for both pieces, while no plain butt was noted for bladelets in levels Fc and Fa1-Fa2.

Thus, the bladelets from the four levels of Unit F can be generally characterized on the basis of the analysis of level Fb1-Fb2, the most abundant sample, as follows:

- a great dominance of unidirectional scar pattern (76.6%), a moderate number of unidirectional-crossed scar pattern (15.6%) and a subordinate position of bidirectional scar pattern (7.8%);

Level Fc	bladelets-tools	bladelets-CMP	bladelets-debitage	Bladelets Total
present			3	3 / 100%
absent				
unidentifiable			5	5
N	0	0	8	8
Level Fb1-Fb2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
present	2	13	220	235 / 91.4/ %
absent	2	9	11	22 / 8.6%
unidentifiable	2	18	127	147
N	6	40	358	404
Level Fa3	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
present		2	30	32 / 88.9%
absent		2	2	4 / 11.1%
unidentifiable		2	23	25
N	0	6	55	61
Level Fa1-Fa2	**bladelets-tools**	**bladelets-CMP**	**bladelets-debitage**	**Bladelets Total**
present	1	1	15	17 / 85%
absent		1	2	3 / 15%
unidentifiable		2	15	17
N	1	4	32	37

Table 33 - Siuren-I. Unit F. Bladelet Butt Abrasion as Percentages of Each Type.

- a very low number (8.1%) of partially cortical pieces with no representation of wholly cortical items;
- a dominance of parallel and converging shape types (78.8% together) in association with "on-axis" removal direction (53%) and partially "off-axis" removal direction (47%), although expanding and irregular shape types (19.3% together) in association with mainly "off-axis" removal direction (47%)occupy a notable position;
- a great prevalence of twisted type (73.2% for all identifiable bladelets and 80.9% for complete bladelets only) over "regular" (flat, incurvate medial and incurvate distal) types of general profile (25% for all identifiable bladelets and 19.1% for complete bladelets only);
- a dominance of feathering distal ends (66%) with a moderate number (18.2%) of "not regular" (hinged and overpassed) types;
- a dominance of trapezoidal and multifaceted types of profiles at midpoint (60% together) which in conjunction with triangular type make up 91.6%, and notable is the dominant position of trapezoidal type (43.3%) over any other type;
- a dominance of "plain-punctiform-linear" group of butt types (65.4%) with the separate significant prevalence of linear type (49.4%) over any other butt type, and the rare (1-2 pieces) occurrence of dihedral and faceted butts;
- a significant dominance of semi-lipped butts (75.4%) with semi-acute angle (86.7%), a moderate number of lipped butts (24%) with acute (10.1%) and some semi-acute angles and no unlipped butts;
- a highly dominant presence of butts with abrasion (95.2%);
- a dominance of "short length" (mean 2.3 cm), a medium width (mean 0.9 cm) and thin thickness (mean 0.2 cm).

Microblades

The large sample of microblades in level Fb1-Fb2 comprises the main basis for the analysis of the Unit F microblade morphological and metric features, while the rare microblades in levels Fc, Fa3 and Fa1-fa2 are simply described.

In terms of condition, microblades from the four levels of Unit F are subdivided into complete and broken pieces, with further distribution of the latter specimens into proximal, medial and distal fragments.

9 microblades of level Fc consist of 6 complete pieces (66.6%) and 3 broken pieces (33.3%) – 1 medial (11.1%) and 2 distal (22.2%).

991 microblades of level Fb1-Fb2 consist of 265 complete pieces (26.7%) and 726 broken pieces (73.3%) – 328 proximal (33.1%), 226 medial (22.8%) and 172 distal (17.4%).

44 microblades of level Fa3 consist of 8 complete pieces (18.2%) and 36 broken pieces (81.8%) – 19 proximal (43.2%), 11 medial (25%) and 6 distal (13.6%).

19 microblades of level Fa1-Fa2 consist of 5 complete pieces (26.3%) and 14 broken pieces (73.7%) – 4 proximal (21%), 6 medial (31.6%) and 4 distal (21%).

Dorsal Scar Pattern. Two scar pattern types have been identified on all microblades in levels Fc, Fa3 and Fa1-Fa2 and three on all microblades in level Fb1-Fb2.

Separately, microblades from each level have the following scar pattern type representation.

Microblades of level Fc: unidirectional – 88.8% and unidirectional-crossed – 11.1%.
Microblades of level Fb1-Fb2: unidirectional – 95.7%, unidirectional-crossed – 4% and bidirectional – 0.3%.
Microblades of level Fa3: unidirectional – 93.2% and unidirectional-crossed – 6.8%.
Microblades of level Fa1-Fa2: unidirectional – 94.7% and bidirectional – 5.3%.

The unidirectional scar pattern is the most common for microblades of Unit F. This is especially clearly seen in the sample

Level Fc	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
cortical				
dorsal-plain				
lateral				
crested				
unidirectional	1		8	90 / 90%
unidirectional-crossed			1	1 / 10%
bidirectional				
3-directional				
centripetal				
core tablet				
unidentifiable				
N	1	0	9	10
Level Fb1-Fb2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
cortical				
dorsal-plain				
lateral				
crested		36		36 / 3.3%
unidirectional	65		948	1013 / 92.8%
unidirectional-crossed			40	40 / 3.7%
bidirectional			3	3 / 0.2%
3-directional				
centripetal				
core tablet				
unidentifiable	1			1
N	66	36	991	1093
Level Fa3	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
cortical				
dorsal-plain				
lateral				
crested		3		3 / 6.1%
unidirectional	2		41	43 / 87.8%
unidirectional-crossed			3	3 / 6.1%
bidirectional				
3-directional				
centripetal				
core tablet				
unidentifiable				
N	2	3	44	49
Level Fa1-Fa2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
cortical				
dorsal-plain				
lateral				
crested				
unidirectional	1		18	19 / 95%
unidirectional-crossed			1	1 / 5%
bidirectional				
3-directional				
centripetal				
core tablet				
unidentifiable				
N	1	0	19	20

Table 34 - Siuren-I. Unit F. Microblade Dorsal Scar Patterns as Percentages of Each Type.

from level Fb1-Fb2, where of 991 microblades, only 43 items have "non-unidirectional" scar patterns.

Comparison of scar pattern types with presence/absence of primary cortex on microblades is only possible for level Fb1-Fb2, as no partially cortical item is known in level Fc, and there is just one (unidirectional) in level Fa1-Fa2 and two (unidirectional and unidirectional-crossed) in level Fa3. The level Fb1-Fb2 pieces with some cortex comprise only 2.3% of the unidirectional microblades, while 20% of unidirectional-crossed and 33.3% of bidirectional microblades have some cortex (8 of 40).

Surface Cortex Area and Location. All microblades from each level of Unit F were used for surface cortex area identification. Non-

Level Fc	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
parallel	1		2	3 / 30%
converging			3	3 / 30%
expanding			2	2 / 20%
ovoid				
irregular			2	2 / 20%
unidentifiable				
N	1	0	9	10
Level Fb1-Fb2	**microblade-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
parallel	35	3	320	358 / 54.6%
converging	13	19	209	241 / 36.8%
expanding	1	3	42	46 / 7.0%
ovoid			1	1 / 0.2%
irregular		1	8	9 / 1.4%
unidentifiable	17	10	411	438
N	66	36	991	1093
Level Fa3	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
parallel	1		32	33 / 71.7%
converging		2	9	11 / 23.9%
expanding		1		1 / 2.2%
ovoid				
irregular			1	1 / 2.2%
unidentifiable	1		2	3
N	2	3	44	49
Level Fa1-Fa2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
parallel	1		11	12 / 63.2%
converging			5	5 / 26.3%
expanding			2	2 / 10.5%
ovoid				
irregular				
unidentifiable			1	1
N	1	0	19	20

Table 35 - Siuren-I. Unit F. Microblade Shapes as Percentages of Each Type.

cortical microblades are highly dominant in three levels: 96.9% in level Fb1-Fb2, 95.4% in level Fa3 and 94.7% in level Fa1-Fa2. Level Fc is characterized by exclusively non-cortical microblades (9 pieces/100%). Wholly cortical specimens are completely absent from all levels. Partially cortical pieces comprise the following percentages: 3.1% in level Fb1-Fb2, 4.6% in level Fa3 and 5.3% in level Fa1-Fa2. Separately analyzed complete microblades show the following cortex data: level Fb1-Fb2 (265 pieces) – non-cortical – 97.3% and partially cortical – 2.7%; levels Fa3 (8 pieces) and Fa1-Fa2 (5 pieces) – only non-cortical (100% each). Seven partially cortical microblades of level Fb1-Fb2 are also subdivided into pieces with significant cortex – 28.8% (2 items) and pieces with insignificant cortex – 71.2% (5 items). These 7 partially cortical microblades of level Fb1-Fb2 are characterized by distal cortex (57.1% - 4 items) and lateral cortex (42.9% - 3 items).

Shape. The following numbers of microblades with definable shapes were used from each level of Unit F: all 9 pieces of level Fc, 580 pieces of level Fb1-Fb2, 42 pieces of level Fa3 and 18 pieces of level Fa1-Fa2. Shape types are presented below.

Level Fc: parallel, expanding and irregular – 22.2% each, and converging – 33.3%.
Level Fb1-Fb2: parallel – 55.2%, converging – 36%, expanding – 7.2%, irregular – 1.4% and ovoid – 0.2%.
Level Fa3: parallel – 76.2%, converging – 21.4% and irregular – 2.4%.
Level Fa1-Fa2: parallel -61.1%, converging – 27.8% and expanding – 11.1%.

Thus, apart from the poorest sample of level Fc, parallel shape is the dominant type for the other three levels (55.2-76.2%). Taken together, parallel and converging shape types are typical in these three levels (88.9-97.6%). On the other hand, expanding and irregular shape types are fairly rare: 8.6-11.1%.

Axis. The following numbers of microblades with definable axis of removal directions was used from each level of Unit F: all 9 pieces in level Fc, 946 pieces in level Fb1-Fb2, 42 pieces in level Fa3 and al 19 pieces in level Fa1-Fa2. Data are as follows.

Level Fc: on-axis – 66.6% and off-axis – 33.3%.
Level Fb1-Fb2: on-axis – 59.6% and off-axis – 40.4%.
Level Fa3: on-axis – 76.2% and off-axis – 23.8%.
Level Fa1-Fa2: on-axis – 31.6% and off-axis – 68.4%.
The data on three levels with small numbers of microblades are quite different from one another and only the large sample from level Fb1-Fb2 can serve as a source of objective information. These data show that "the on-axis" type is about 1.5 times more common than the "off-axis" type, which is not a very significant prevalence.

Level Fc	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
on-axis			6	6 / 60%
off-axis	1		3	4 / 40%
unidentifiable				
N	1	0	9	10
Level Fb1-Fb2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
on-axis	21	9	564	594 / 57.4%
off-axis	41	18	382	441 / 42.6%
unidentifiable	4	9	45	58
N	66	36	991	1093
Level Fa3	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
on-axis			32	32 / 69.6%
off-axis	1	3	10	14 / 30.4%
unidentifiable	1		2	3
N	2	3	44	49
Level Fa1-Fa2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
on-axis			6	6 / 30%
off-axis	1		13	14 / 70%
unidentifiable				
N	1	0	19	20

Table 36 - Siuren-I. Unit F. Microblade Axis as Percentages of Each Type.

General Profiles of Microblades. These data are based on separate analysis of all definable microblades and complete microblades taken separately.

Level Fc. All 9 microblades have the following general profile types: twisted – 88.8% and incurvate medial – 11.1%. On the other hand, all 6 complete microblades are twisted (100%).
Level Fb1-Fb2. There are 954 definable microblades with the following general profile types: twisted – 76.9%, incurvate medial – 13.3%, flat – 7.5%, incurvate distal – 1.5% and convex – 0.8%. For 265 complete microblades: 75.5% of twisted type, 14% of incurvate medial type, 7.9% of flat type, 1.5% of incurvate distal type and 1.1% of convex type.
Level Fa3. All 44 microblades have the following general profile types: twisted – 86.4%, incurvate medial and flat – 6.8% each. All 8 complete microblades are twisted (100%).
Level Fa1-Fa2. All 19 microblades have the following types of general profile: twisted – 89.4%, flat and incurvate medial – 5.3% each. All 5 complete microblades are twisted (100%).

The twisted type dominates over "regular" (flat, incurvate medial and incurvate distal) types of general profile. The percentage of twisted type fluctuates from 76.9% to 89.4% for all identifiable pieces in all four levels, and for level Fb1-Fb2 it remains practically the same (75.5%) for only complete items, while in the other three levels complete microblades are always twisted (100%). On the other hand, "regular" types are only in ranges 10.6 – 22.3% for all definable pieces in all four levels and 23.4% (about in 3 times lower than the twisted type) for only complete items in level Fb1-Fb2.

Profiles at Distal End. Data for these analyses are recorded on 7 definable microblades of level Fc, 438 definable microblades of level Fb1-Fb2, 14 definable microblades of level Fa3 and 9 definable microblades of level Fa1-Fa2. Data on the range of types are summarized below.

Level Fc: feathering – 57.1%, hinged – 28.6%, blunt – 14.3% (a single piece); Level Fb1-Fb2: feathering – 81.5%, blunt – 9.1%, hinged – 8.7%, overpassed – 0.7%; Level Fa3: feathering – 71.4%, blunt and hinged – 14.3% each; Level Fa1-Fa2: feathering – 88.8% and blunt – 11.1% (a single piece).

All four levels demonstrate the dominance of feathering distal ends for microblades. Real type structure is seen for the microblades of level Fb1-Fb2, where there is a great dominance of feathering type (81.5%) while "not regular" (hinged and overpassed) types together comprise only 9.4%.

Profiles at Midpoint. Data for the following analysis were based on all microblades from each level of Unit F. The detailed data on their type representations are given below.
Level Fc: triangular – 88.8% and trapezoidal – 11.1% (a single piece).
Level Fb1-Fb2: trapezoidal – 45.1%, triangular – 43.9%, multifaceted – 7.5% and lateral steep – 3.5%.
Level Fa3: trapezoidal – 52.4%, triangular – 29.5%, multifaceted – 13.6% and lateral steep – 4.5%.
Level Fa1-Fa2: trapezoidal – 47.4%, triangular – 42.1% and multifaceted – 10.5%.

Thus, only four types of profiles at midpoint were identified for microblades of Unit F where, aside from the poorest sample of level Fc, the trapezoidal type is dominant – 45.1-52.4% in levels Fb1-Fb2, Fa3 and Fa1-Fa2. Moreover, trapezoidal and multifaceted types together are common in these levels (52.6-66%). Aside from the very minor presence of lateral steep profiles at midpoint for microblades in levels Fb1-Fb2 and Fa3, all other microblades have triangular profiles at midpoint (29.5-43.9%).

Butt Types. This analysis is based on the following numbers of definable microblade butts from each level of Unit F: 6 from level Fc, 593 from level Fb1-Fb2, 27 from level Fa3 and 9 from level Fa1-Fa2. Their type representation is listed below.

Level Fc	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
flat				
incurvate medial			1	1 / 10%
incurvate distal				
convex				
twisted	1		8	9 / 90%
unidentifiable				
N	1	0	9	10
Level Fb1-Fb2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
flat	2	4	72	78 / 7.4%
incurvate medial	3	5	127	135 / 12.8%
incurvate distal		1	14	15 / 1.4%
convex			8	8 / 0.8%
twisted	59	23	733	815 / 77.6%
unidentifiable	2	3	37	42
N	66	36	991	1093
Level Fa3	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
flat			3	3 / 6.1%
incurvate medial		1	3	4 / 8.2%
incurvate distal		1		1 / 2.0%
convex				
twisted	2	1	38	41 / 83.7%
unidentifiable				
N	2	3	44	49
Level Fa1-Fa2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
flat			1	1 / 5%
incurvate medial			1	1 / 5%
incurvate distal				
convex				
twisted	1		17	18 / 90%
unidentifiable				
N	1	0	19	20

Table 37 - Siuren-I. Unit F. Microblade General Profiles as Percentages of Each Type.

Level Fc	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
feathering			4	4 / 57.1%
hinged			2	2 / 28.6%
overpassed				
blunt			1	1 / 14.3%
unidentifiable	1		2	3
N	1	0	9	10
Level Fb1-Fb2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
feathering	16	19	357	392 / 82.0%
hinged		4	38	42 / 8.8%
overpassed		1	3	4 / 0.8%
blunt			40	40 / 8.4%
unidentifiable	50	12	553	615
N	66	36	991	1093
Level Fa3	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
feathering		2	10	12 / 75%
hinged			2	2 / 12.5%
overpassed				
blunt			2	2 / 12.5%
unidentifiable	2	1	30	33
N	2	3	44	49
Level Fa1-Fa2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
feathering			8	8 / 88.8%
hinged				
overpassed				
blunt			1	1 / 11.1%
unidentifiable	1		10	11
N	1	0	19	20

Table 38 - Siuren-I. Unit F. Microblade Profiles at Distal End as Percentages of Each Type.

Level Fc	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
flat				
triangular			8	8 / 80%
trapezoidal	1		1	2 / 20%
multifaceted				
lateral steep				
crescent				
irregular				
unidentifiable				
N	1	0	9	10
Level Fb1-Fb2	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
flat				
triangular	26	16	435	477 / 43.7%
trapezoidal	34		447	481 / 44.0%
multifaceted	5		74	79 / 7.2%
lateral steep		20	35	55 / 5.1%
crescent				
irregular				
unidentifiable	1			1
N	66	36	991	1093
Level Fa3	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
flat				
triangular		2	13	15 / 30.6%
trapezoidal	2		23	25 / 51.1%
multifaceted			6	6 / 12.2%
lateral steep		1	2	3 / 6.1%
crescent				
irregular				
unidentifiable				
N	2	3	44	49
Level Fa1-Fa2	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
flat				
triangular			8	8 / 40%
trapezoidal	1		9	10 / 50%
multifaceted			2	2 / 10%
lateral steep				
crescent				
irregular				
unidentifiable				
N	1	0	19	20

Table 39 - Siuren-I. Unit F. Microblade Profiles at Midpoint as Percentages of Each Type.

Level Fc: linear – 66.6%, dihedral and crushed – 16.7% each (a single piece each).
Level Fb1-Fb2: linear – 47.4%, punctiform – 9.1%, plain – 3.2%, cortical – 0.2% (a single piece), dihedral – 2.4%, finely-faceted – 0.3% and crushed – 37.4%.
Level Fa3: linear – 40.8%, punctiform – 18.5%, plain – 11.1%, dihedral – 3.7% (a single piece) and crushed – 25.9%.
Level Fa1-Fa2: linear – 55.5%, punctiform – 11.1% (a single piece) and crushed – 33.3%.

The linear butt type is the most common for microblades in all four levels – 40.8-66.6%. The "plain-punctiform-linear" group of butt types is almost exclusive in levels Fc, Fa3 and Fa1-Fa2 excluding crushed butts and a single dihedral butt. This is also true for microblades of level Fb1-Fb2 as well, where the "plain-punctiform-linear" group of butt types makes up 59.7%, dihedral and finely-faceted types are represented by less than 3% together, a single cortical butt and a fair number of crushed butts (37.4%).

Lipping. The following numbers of microblade butts suitable for lipping identification were used in each level of Unit F: 5 in level Fc, 373 in level Fb1-Fb2, 20 in level Fa3 and 6 in level Fa1-Fa2. Their lipping characteristics are as follows.

Level Fc: semi-lipped – 60% and lipped – 40%; Level Fb1-Fb2: semi-lipped – 85.3%, lipped – 13.9% and not lipped – 0.8%; Level Fa3: semi-lipped – 85%, lipped – 10% and not lipped – 5% (a single piece); Level Fa1-Fa2: semi-lipped – 100%.

Thus, there is a common dominance of semi-lipped butts (60-100%), a subordinate position of lipped butts (10-13.9% in levels Fb1-Fb2 and Fa3) and an occasional presence of not lipped butts. The ratio of lipped to not lipped butts (17.3:1) in level Fb1-Fb2 firmly confirms the latter observation.

Butt Angle. The following numbers of microblades butts suitable for angle identification were used in each level of Unit F: 5 in level Fc, 371 in level Fb1-Fb2, 20 in level Fa3 and 6 in level

Level Fc	microblades-tools	microblade-CMP	microblade-debitage	Microblades Total
cortical				
plain				
punctiform				
linear	1		4	5 / 71.4%
dihedral			1	1 / 14.3%
crudly-faceted				
finely-faceted				
crushed			1	1 / 14.3%
missing			3	3
N	1	0	9	10
Level Fb1-Fb2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
cortical		1	1	2 / 0.3%
plain	1	2	19	22 / 3.3%
punctiform	3	9	54	66 / 10.0%
linear	31	4	281	316 / 47.9%
dihedral	1		14	15 / 2.3%
crudly-faceted				
finely-faceted			2	2 / 0.3%
crushed	8	7	222	237 / 35.9%
missing	22	13	398	433
N	66	36	991	1093
Level Fa3	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
cortical				
plain		1	3	4 / 12.9%
punctiform		1	5	6 / 19.4%
linear	1		11	12 / 38.7%
dihedral			1	1 / 3.2%
crudly-faceted				
finely-faceted				
crushed		1	7	8 / 25.8%
missing	1		17	18
N	2	3	44	49
Level Fa1-Fa2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
cortical				
plain	1			1 / 10%
punctiform			1	1 / 10%
linear			5	5 / 50%
dihedral				
crudly-faceted				
finely-faceted				
crushed			3	3 / 30%
missing			10	10
N	1	0	19	20

Table 40 - Siuren-I. Unit F. Microblade Butt Types as Percentages of Each Type.

Fa1-Fa2, with their characteristics given below.

Level Fc: semi-acute – 80% and acute – 20% (a sole piece).
Level Fb1-Fb2: semi-acute – 91.6%, acute – 5.4% and right – 3%.
Level Fa3: semi-acute – 75%, right – 15% and acute – 10%.
Level Fa1-Fa2: semi-acute – 100%.

There is a clear dominance of semi-acute angle (75-100%). Level Fb1-Fb2 shows a slight prevalence of acute angle over right angle (1.8:1) that, with the very high percentage of semi-acute angle (91.6%) in this level, evidences the occasional occurrence of both acute and right angles there.

Butt Abrasion. The following numbers of identifiable microblade butts for presence/absence of abrasion were used from the four levels of Unit F: 6 in level Fc, 587 in level Fb1-Fb2, 27 in level Fa3 and 8 in level Fa1-Fa2. Abrasion data are as follows.

Level Fc: present – 100%.
Level Fb1-Fb2: present – 96.3% and absent – 3.7%.
Level Fa3: present – 88.9% and absent – 11.1% (3 pieces).
Level Fa1-Fa2: present – 87.5% and absent – 12.5% (1 piece).

Nearly all microblade butts have abrasion (87.5-100% in four levels), especially observed in the high prevalence of butts with abrasion over butts with no abrasion in level Fb1-Fb2 in the following ratio – 25.7:1.

Metrics (Length, Width, Thickness) of Microblades. Detailed metric data are mainly based on the analysis of complete pieces (es-

Level Fc	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
lipped			2	2 / 33.3%
semi-lipped	1		3	4 / 66.7%
not lipped				
unidentifiable			4	4
N	1	0	9	10
Level Fb1-Fb2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
lipped	7		52	59 / 14.1%
semi-lipped	29	9	318	356 / 85.2%
not lipped			3	3 / 0.7%
unidentifiable	30	27	618	675
N	66	36	991	1093
Level Fa3	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
lipped			2	2 / 8.7%
semi-lipped	1	2	17	20 / 87.0%
not lipped			1	1 / 4.3%
unidentifiable	1	1	24	26
N	2	3	44	49
Level Fa1-Fa2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
lipped				
semi-lipped	1		6	7 / 100%
not lipped				
unidentifiable			13	13
N	1	0	19	20

Table 41 - Siuren-I. Unit F. Microblade Butt Lipping as Percentages of Each Type.

Level Fc	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
right				
semi-acute	1		4	5 / 83.3%
acute			1	1 / 16.7%
unidentifiable			4	
N	1	0	9	10
Level Fb1-Fb2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
right	1		11	12 / 2.9%
semi-acute	27	9	340	376 / 90.4%
acute	8		20	28 / 6.7%
unidentifiable	30	27	620	677
N	66	36	991	1093
Level Fa3	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
right			3	3 / 13.0%
semi-acute	1	2	15	18 / 78.3%
acute			2	2 / 8.7%
unidentifiable	1	1	24	26
N	2	3	44	49
Level Fa1-Fa2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
right				
semi-acute	1		6	7 / 100%
acute				
unidentifiable			13	13
N	1	0	19	20

Table 42 - Siuren-I. Unit F. Microblade Butt Angles as Percentages of Each Type.

pecially from level Fb1-Fb2) with some additional comparable data on broken microblades.

Length. These data are given separately for each level.

Level Fc. All 6 complete microblades have length more than 1.5 cm (100%) and one is even longer 3.0 cm – 3.6 cm. Mean length is 2.3 cm. All 3 broken microblades are in the interval 1.6-3.0 cm (100%) with the longest piece 2.6 cm.

Level Fb1-Fb2. There are 175 pieces/66.1% in metric interval 0.6-1.5 cm and 90 pieces/33.9% with length more than 1.5 cm among 265 complete microblades. There are only 3 pieces longer 3.0 cm (1.1%) with the longest 3.4 cm. Mean length is 1.4 cm.

Level Fc	microblades-tools	microblades-CMP	microblades-debitage	Microblades Total
present	1		6	7 / 100%
absent				
unidentifiable			3	3
N	1	0	9	10
Level Fb1-Fb2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
present	44	7	565	616 / 95.2%
absent		9	22	31 / 4.8%
unidentifiable	22	20	404	446
N	66	36	991	1093
Level Fa3	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
present	1	1	24	26 / 86.7%
absent		1	3	4 / 13.3%
unidentifiable	1	1	17	19
N	2	3	44	49
Level Fa1-Fa2	**microblades-tools**	**microblades-CMP**	**microblades-debitage**	**Microblades Total**
present	1		7	8 / 88.8%
absent			1	1 / 11.1%
qustionable				
unidentifiable			11	11
N	1	0	19	20

Table 43 - Siuren-I. Unit F. Microblade Butt Abrasion as Percentages of Each Type.

Broken microblades with length less than or equal to 1.5 cm account for 651 pieces/89.7% and only 75 pieces/10.3% have length more than 1.5 cm with the longest one 2.9 cm among all 726 broken microblades.

Level Fa3. There are 6 pieces/75% with length less than or equal to 1.5 cm and only 2 pieces/25% with length more than 1.5 cm with the longest piece 1.8 cm among all 8 complete microblades. Mean length is 1.4 cm. There are also 26 pieces/72.2% with length less than or equal to 1.5 cm and 10 pieces/27.8% with length more than 1.5 cm (the longest one 2.1 cm) among all 36 broken microblades.

Level Fa1-Fa2. Only 1 complete microblade is less than 1.5 cm in length (1.2 cm) that is 20%, while the other 4 complete microblades (80%) are longer than 1.5 cm with the longest piece 2.6 cm. Mean length is 2.1 cm. On the other hand, 8 broken pieces/57.1% have length less than or equal to 1.5 cm, while 6 other broken pieces/42.9% are longer than 1.5 cm with the longest item 1.8 cm.

Thas, taking into account the largest sample of 265 specimens from the level Fb1-Fb2 complete microblades, it is clear that "short" microblades dominate in Unit F.

Width. The following width distribution of complete microblades is observed: 0.6 cm – 5 pieces/83.3% in level Fc, 70 pieces/26.4% in level Fb1-Fb2, 4 pieces/50% in level Fa3 and 5 pieces/100% in level Fa1-Fa2; 0.5 cm – 1 piece/16.7% in level Fc, 80 pieces/30.2% in level Fb1-Fb2 and 2 pieces/25% in level Fa3; 0.4 cm – 67 pieces/25.3% in level Fb1-Fb2 and 2 pieces/25% in level Fa3; 0.3 cm – 48 pieces/18.1% in level Fb1-Fb2. Mean width for complete microblades are as follows: 0.6 cm for levels Fc and Fa1-fa2, 0.5 cm for levels Fb1-Fb2 and Fa3.

The width data for broken microblades are as follows: 0.6 cm – 2 pieces/66.6% in level Fc, 242 pieces/33.3% in level Fb1-Fb2, 12 pieces/33.3% in level Fa3 and 7 pieces/50% in level Fa1-Fa2; 0.5 cm – 1 piece/33.3% in level Fc, 187 pieces/25.8% in level Fb1-Fb2, 10 pieces/27.8% in level Fa3 and 3 pieces/21.4% in level Fa1-Fa2; 0.4 cm – 183 pieces/25.2% in level Fb1-Fb2, 12 pieces/33.3% in level Fa3 and 2 pieces/14.3% in level Fa1-Fa2; 0.3 cm – 106 pieces/14.6% in level Fb1-Fb2, 2 pieces/5.6% in level Fa3 and 1 piece/7.1% in level Fa1-Fa2; 0.2 cm – 8 pieces/1.1% in level Fb1-Fb2 and 1 piece/7.1% in level Fa1-Fa2. Mean width for broken microblades are the following: 0.6 cm for level Fc and 0.5 cm for levels Fb1-Fb2, Fa3 and Fa1-Fa2.

Overall, mean width for all microblades are comparable to means for broken microblades: 0.6 cm for level Fc and 0.5 cm for levels Fb1-Fb2, Fa3 and Fa1-Fa2. At the same time, it is worth noting the presence of a large number of microblades with width 0.2-0.4 cm – 412 pieces/41.5% in level Fb1-Fb2, 16 pieces/36.3% in level Fa3 and 4 pieces/21.1% in level Fa1-Fa2, where pieces with width of 0.3 cm comprise the following: – 154 pieces/15.5% in level Fb1-Fb2, 2 pieces/4.5% in level Fa3 and 1 piece/5.3% in level Fa1-Fa2 and even a minimal presence of pieces 0.2 cm wide is notable – 8 pieces/0.8% in level Fb1-Fb2 and 1 piece/5.3% in level Fa3.

Thus, although mean width of 0.6-0.5 cm shows the dominance of rather "wide" microblades, the presence of many "narrow" microblades should be kept in mind.

Thickness. Mean thickness subdivides the microblades of Unit F into two groups. One includes levels Fc and Fa1-Fa2 where mean thickness of 0.2 cm is the same for all microblade categories – complete, broken and all microblades together. On the other hand, microblades from levels Fb1-Fb2 and Fa3 (complete, broken and all together) have mean thickness of 0.1 cm. Microblades of each level have thickness in the following intervals: 0.1-0.3 cm – for levels Fc, Fa3 and Fa1-Fa2 and 0.1-0.4 cm for level Fb1-Fb2, although pieces with thickness 0.3-0.4 cm comprise only 2.9% in the latter level.

Microblades of Unit F are thus "feather-shaped" or "string-like".

Butt Sizes. Mean width for microblade butts are as follows: 0.4 cm in level Fc (5 butts) and 0.3 cm in levels Fb1-Fb2 (317 butts), Fa3 (15 butts) and Fa1-Fa2 (5 butts). Mean microblade butt height is the same for all levels (0.1 cm), connected to the great predominance of linear butts among all butts appropriate for measurement. No plain butt is noted for microblades in levels Fc and Fa1-Fa2 as well. Plain butts have the following mean width – 0.3 cm in level Fb1-Fb2 (19 butts) and 0.4 cm in in level Fa3 (3 butts) and mean height of 0.2 cm for both levels.

In total, the microblades of the four levels of Unit F would be better summarized on the basis of the analysis of the level Fb1-Fb2 microblade sample and, accordingly, can be generally characterized by:
- an almost exclusive presence of unidirectional scar pattern (95.7%) and a very rare representation of unidirectional-crossed (4%) and bidirectional (0.3%) scar patterns;
- a presence of very few partially cortical pieces (3.1%);
- a great dominance of parallel and converging shape types (91.2%) with near-equal association of "on-axis" (59.6%) and "off-axis" (40.4%) removal directions;
- an absolute prevalence of twisted type (76.9-75.5%) over "regular" (flat, incurvate medial and incurvate distal) types (22.3-23.4%) of general profiles;
- a dominance of feathering distal ends (81.5%) and a minor presence of "not regular" (hinged and overpassed) types (9.4%);
- a dominance of trapezoidal type of profile at midpoint (45.1%), which in conjunction with multifaceted type, prevails as half of all pieces – 52.6%;
- a great dominance of the "plain-punctiform-linear" group of butt types (59.7% where linear type alone is 47.4%) with, at the same time, a poor representation of dihedral and finely-faceted butts (2.7%), occasional presence of a single cortical butt (0.2%) and a significant portion of crushed butts (37.4%);
- a great dominance of semi-lipped butts (85.3%) with semi-acute angle (91.6%), a subordinate position of lipped butts (13.9%) with acute (5.4%) and some semi-acute angles, and an occasional presence of not lipped butts (0.8%) with right angle (3%);
- a dominant presence of butt abrasion (96.3%);
- a dominance of "short" length (1.4 cm in mean), medium width (0.5 cm in mean, although pieces 0.4-0.2 cm wide are also numerous – 41.5%) and "feathering-like" thickness (0.1 cm in mean).

Some summarizing data on the debitage

A very short debitage summary is presented here (see also tabl. 3B-3C, 4-43). At the very general artifact category level, debitage samples from the four levels of Unit F show some surprising correlations with frequencies of debris in these levels (tabl. 1). The lowest debitage percentage is known for level Fb1-Fb2 (27.3%) but the level is also characterized by the highest representation of debris there (67.2%). On the other hand, level Fc shows the highest debitage index (57.2%) and the lowest debris level (28.6%). Accordingly, it is possible to use these data to consider flint exploitation patterns at the site during human occupations of the different archaeological levels in Unit F. At the same time, debitage of level Fb1-Fb2 comprises 84.9% of all Unit F debitage pieces (2217 items altogether) while none of the other three levels has a debitage percentage of more than 10%: 1.6% for level Fc, 8.7% for level Fa3 and 4.8% for level Fa1-Fa2. Level Fb1-Fb2 is thus the most characteristic one for discussion of debitage pieces. The internal debitage structure within this level (22.5% flakes, 5.9% blades, 19.0% bladelets, 52.6% microblades) shows the very dominant microblade production at the site, while bladelets are almost three times less represented, with a very poor blade occurrence in comparison to microblades: 0.11:1.0. The much lower numbers of debitage pieces for the other three levels with somewhat different internal structure again evidences differences in flint exploitation in the excavated areas. Another interesting debitage situation is shown by the different flint types used for the various debitage categories. Colored flints were more frequently used for bladelet and microblade production than for flakes and blades (see tabl. 49).

Tools

Data on tools are represented first by level and and then summarized together for the entire Unit F archaeological sequence to attempt to identify possible features in common and differences. There are 182 pieces with retouch and/or use-wear in all assemblages of the Unit F four levels (see tabl. 44-48).

Level Fc

Tools include only four specimens that are subdivided into three groups: 1) retouched pieces – 2 items/50%; 2) non-geometric microliths – 1 item/25%; 3) non-flint tools – 1 item/25%. No indicative Upper Paleolithic tool types or unidentifiable tool fragments, as well as waste from tool production and rejuvenation, were found in the lithic assemblage of level Fc.

Retouched pieces. These include 1 blade and 1 flake, both with marginal continuous retouch.

The retouched blade has lateral dorsal retouch. This is a complete non-cortical piece on gray flint, 4.1 cm long, 1.7 cm wide and 0.5 cm thick. Morphology: unidirectional scar pattern, expanding shape, "on-axis" removal direction, twisted general profile, hinged distal end, triangular profile at midpoint and plain (0.6 x 0.3 cm) butt (not lipped, right angle, with abrasion).

The retouched flake is a complete non-cortical piece on gray flint with distal dorsal retouch and the following dimensions: length – 1.7 cm, width – 2.1 cm (shortened, transversal proportions), thickness – 0.4 cm. Morphologically, it has an unidentifiable scar pattern, expanding shape, "on-axis" removal direction, incurvate distal general profile, feathering distal end, multifaceted profile at midpoint and crushed butt.

Non-geometric microliths. A single artifact belongs to the non-geometric microlith group. It is Dufour bladelet on microblade with inverse retouch on gray flint. The left edge of this piece has partial semi-abrupt marginal retouch. The microblade, as a blank, is a distal part (length – 1.9 cm) of an "on-axis" piece with twisted profile.

Groups & Types	Fa1-Fa2	Fa3	Fb1-Fb2	Fc	TOTAL	
	N	N	N	N	N	%
INDICATIVE UPPER PALEOLITHIC TOOL TYPES	**5** / *55.5%*	**5** / *29.4%*	**31** / *20.4%*		**41**	22.5%
END-SCRAPERS	*2*	*1*	*15*		*18*	*9.9%*
Simple flat		1	4		5	
Atypical			1		1	
Ogival			1		1	
Circular			1		1	
Carinated			2		2	
Thick shouldered	1		1		2	
Flat shouldered	1		1		2	
Fragments of flat end-scrapers' working fronts			4		4	
BURINS	*2*	*4*	*13*		*19*	*10.4%*
Dihedral symmetrical		1			1	
Dihedral asymmetrical		1	2		3	
Dihedral angle			2		2	
Double dihedral symmetrical			1		1	
Double dihedral asymmetrical		1			1	
Carinated	1	1	1		3	
Angle			2		2	
On oblique straight truncation			2		2	
On oblique concave truncation	1		1		2	
Transverse on lateral preparation			1		1	
Broken (unidentifiable)			1		1	
COMPOSITE TOOLS			*2*		*2*	*1.1%*
End-scraper simple / Burin dihedral asymmetrical			1		1	
End-scraper simple / Burin carinated (busquoid)			1		1	
TRUNCATIONS	*1*		*1*		*2*	*1.1%*
NON-GEOMETRIC MICROLITHS	**2** / *22.2%*	**2** / *11.8%*	**72** / *47.4%*	**1** / *25%*	**77**	42.3%
"NEUTRAL" TOOL TYPES			**3** / 2.0%		**3**	1.7%
NOTCHED PIECES			*2*		*2*	
DENTICULATED PIECES			*1*		*1*	
RETOUCHED PIECES (with marginal and/or irregular retouch)	**1** / *11.1%*	**6** / 35.3%	**36** / *23.7%*	**2** / *50%*	**45**	24.7%
UNIDENTIFIABLE TOOL FRAGMENTS	**1** / *11.1%*	**4** / *23.5%*	**9** / *5.9%*		**14**	7.7%
NON-FLINT TOOLS			**1** / *0.6%*	**1** / *25%*	**2**	1.1%
GRINDING TOOLS				*1*	*1*	*0.55%*
RETOUCHERS			*1*		*1*	*0.55%*
TOTAL	**9** / *100%*	**17** / *100%*	**152** / *100%*	**4** / *100%*	**182**	100.0%

Table 44 - Siuren-I. Unit F. Tools General Structure & Classification.

Non-flint tool. The non-flint tool is a small limestone cortical flake (length – 2.7 cm, width – 2.9 cm, thickness – 0.7 cm) with a series of long shallow striations on its natural pebble primary surface. This wear is typical of grinding tools during which use the tool was probably broken. Because of such breakage, this flake is part of the lithic assemblage of level Fc.

Level Fb1-Fb2

Tools include 152 specimens subdivided into five groups: 1) indicative tool types – 34 pieces/22.4%; 2) retouched pieces – 36 pieces/23.7%; 3) unidentifiable tool fragments – 9 pieces/5.9%; 4) non-geometric microliths – 72 pieces/47.4%; 5) non-flint tools – 1 piece/0.6%.

Indicative tool types. These tools include 15 end-scrapers, 13 burins, 2 composite tools, 1 truncation, 2 notched pieces and 1 denticulated piece.

End-scrapers are represented by 4 simple, 1 atypical, 1 ogival, 1 circular, 2 carinated, 1 thick shouldered, 1 flat shouldered specimens and 4 fragments of flat end-scraper working fronts. All are made on gray flint.

All 4 *simple end-scra*pers have convex working fronts located on the dorsal surface distal ends with the following retouch characteristics: 1 non-convergent sub-parallel semi-steep (fig. 3:1), 1 non-convergent scalar steep (fig. 3:4) and 2 convergent sub-parallel semi-steep (fig. 3:3 and fig. 3:2). All are on complete non-cortical blades (3) and 1 flake which as blanks have the following morphological features and metric parameters. The first simple end-scraper (fig. 3:1) is on a blade 4.2 cm long, 1.9 cm wide and 0.5 cm thick with unidirectional scar pattern, expanding shape, "off-axis" removal direction, twisted general profile, unidentifiable as retouched distal end, multifaceted profile at midpoint and linear (0.4 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion). The second simple end-

Groups & Types	Fa1-Fa2	Fa3	Fb1-Fb2	Fc	TOTAL
Pieces with flat and/or semi-abrupt retouch	**2 / 100%**	**2 / 100.0%**	**69 / 95.8%**	**1 / 100%**	**74 / 96.1%**
Dufour, *microblades with alternate retouch*	1		8		9
Dufour, *microblades with ventral retouch*			25	1	26
TOTAL:	1 / 50%		33 / 45.8%	1 / 100%	35 / 45.5%
Pseudo-Dufour, *bladelets with dorsal retouch*			3		3
Pseudo-Dufour, *microblades with dorsal retouch*		2	22		24
Pseudo-Dufour, *microblades with bilateral dorsal retouch*			6		6
TOTAL:		2 / 100%	31 / 43.1%		33 / 42.8%
Bladelets *with dorsal retouch at distal end*	1				1
Microblades *with lateral dorsal micro-notch*			1		1
Truncated Bladelets			3		3
Truncated Microblades			1		1
TOTAL:	1 / 50%		5 / 6. 9%		6 / 7.8%
Pieces with backed lateral retouch			**3 / 4.2%**		**3 / 3.9%**
Backed Microblades			3		3
TOTAL	**2**	**2**	**72**	**1**	**77**

Table 45 - Siuren-I. Unit F. Non-Geometric Microliths Classification.

		Dufour	Pseudo-Dufour	Backed Microblades	N	%
LEVEL Fa1-Fa2						
LEFT EDGE	MARGINAL SCALAR STEPPED	1			1	50%
RIGHT EDGE	MARGINAL SCALAR STEPPED	1			1	50%
TOTAL		2			2	100%
LEVEL Fa3						
LEFT EDGE	MARGINAL SCALAR STEPPED					
RIGHT EDGE	MARGINAL SCALAR STEPPED		2		2	100%
TOTAL			2		2	100%
LEVEL Fb1-Fb2						
LEFT EDGE	MARGINAL SCALAR STEPPED	6 3	4 4	1	11 7	13.4% 8.5%
RIGHT EDGE	MARGINAL SCALAR STEPPED	22 8 3	16 11 1	 3	38 19 7	46.4% 23.2% 8.5%
TOTAL		42	36	4	82	100%
LEVEL Fc						
LEFT EDGE	MARGINAL SCALAR STEPPED	1			1	100%
RIGHT EDGE	MARGINAL SCALAR STEPPED					
TOTAL		1			1	100%

Table 46 - Siuren-I. Unit F. Non-Geometric Microliths: Retouch Types.

		Dufour	Pseudo-Dufour	Backed Microblades	N	%
LEVEL Fa1-Fa2						
LEFT EDGE	FLAT SEMI-ABRUPT ABRUPT	1			1	50%
RIGHT EDGE	FLAT SEMI-ABRUPT ABRUPT	1			1	50%
TOTAL		2			2	100%
LEVEL Fa3						
LEFT EDGE	FLAT SEMI-ABRUPT ABRUPT					
RIGHT EDGE	FLAT SEMI-ABRUPT ABRUPT		2		2	100%
TOTAL			2		2	100%
LEVEL Fb1-Fb2						
LEFT EDGE	FLAT SEMI-ABRUPT ABRUPT	 7 2	3 5	1	4 12 2	4.9% 14.6% 2.4%
RIGHT EDGE	FLAT SEMI-ABRUPT ABRUPT	5 28	5 23	 3	10 51 3	12.2% 62.2% 3.7%
TOTAL		42	36	4	82	100%
LEVEL Fc						
LEFT EDGE	FLAT SEMI-ABRUPT ABRUPT	1			1	100%
RIGHT EDGE	FLAT SEMI-ABRUPT ABRUPT					
TOTAL		1			1	100%

Table 47 - Siuren-I. Unit F. Non-Geometric Microliths: Retouch Angles.

scraper (fig. 3:2) is on a primary crested blade 5.2 cm long, 1.7 cm wide and 1.5 cm thick with a bilateral central wholly crested ridge and irregular shape, "off-axis" removal direction, twisted general profile, unidentifiable as retouched distal end, triangular profile at midpoint and crushed butt. The third simple end-scraper (fig. 3:3) is on a truly secondary crested blade (no preserved crested ridge) with unidirectional scar pattern, parallel shape, "off-axis" removal direction, twisted general profile, unidentifiable as retouched distal end, triangular profile at midpoint, plain (0.5 x 0.2 cm) butt (semi-lipped, semi-acute angle, with abrasion) and is 4.0 cm long, 1.7 cm wide, 0.9 cm thick. The fourth simple end-scraper (fig. 3:4) is on a flake (length – 4.5 cm, width – 2.9 cm, thickness – 0.7 cm) with unidirectional scar pattern, expanding shape, "on-axis" removal direction, twisted general profile, unidentifiable as retouched distal end, trapezoidal profile at midpoint and crushed butt.

An *atypical end-scraper* is characterized by a weakly developed and partially broken convex working front, formed on a non-cortical complete blade's dorsal surface distal end by irregular partial steep retouch. The blade, as a blank, is characterized by unidirectional scar pattern, converging shape, "off-axis" removal direction, incurvate medial general profile, blunt distal end, multifaceted profile at midpoint and plain (1.3 x 0.2 cm) butt (semi-lipped, semi-acute angle, with abrasion). It is 4.5 cm long, 2.0 cm wide and 1.0 cm thick.

An *ogival end-scraper* is on the tool's distal end (length – 2.1 cm, width – 2.2 cm, thickness – 1.2 cm) – an unidentifiable blank that only allows us to make its typological definition as ogival with non-convergent scalar steep retouch.

A *circular end-scraper* (fig. 3:5) is on a complete wholly cortical small flake (length – 3.0 cm, width – 2.5 cm, thickness – 1.3 cm) with a front formed by non-convergent scalar steep and partially thick (non-lamellar scars) retouch, encircling the entire perimeter of the flake. The flake, as a blank, is also characterized by ovoid shape, "off-axis" removal direction and flat general profile.

		Dufour	Pseudo-Dufour	Backed Microblades	N	%
LEVEL Fa1-Fa2						
LEFT EDGE	CONTINUOUS					
	DISCONTINUOUS					
	PARTIAL	1			1	50%
RIGHT EDGE	CONTINUOUS					
	DISCONTINUOUS					
	PARTIAL	1			1	50%
TOTAL		2			2	100%
LEVEL Fa3						
LEFT EDGE	CONTINUOUS					
	DISCONTINUOUS					
	PARTIAL					
RIGHT EDGE	CONTINUOUS		2		2	100%
	DISCONTINUOUS					
	PARTIAL					
TOTAL			2		2	100%
LEVEL Fb1-Fb2						
LEFT EDGE	CONTINUOUS	5	3	1	9	11.0%
	DISCONTINUOUS					
	PARTIAL	4	5		9	11.0%
RIGHT EDGE	CONTINUOUS	23	14	2	39	47.5%
	DISCONTINUOUS	1	2		3	3.7%
	PARTIAL	9	12	1	22	26.8%
TOTAL		42	36	4	82	100%
LEVEL Fc						
LEFT EDGE	CONTINUOUS					
	DISCONTINUOUS					
	PARTIAL	1			1	100%
RIGHT EDGE	CONTINUOUS					
	DISCONTINUOUS					
	PARTIAL					
TOTAL		1			1	100%

Table 48 - Siuren-I. Unit F. Non-Geometric Microliths: Retouch Features.

Two *carinated end-scrapers* are on complete partially cortical chunks. Both are similar. They are characterized by a rather limited width of generally convex fronts – 2.2 cm (fig. 3:6) and 3.2 cm (fig. 3: 7), formed by non-convergent sub-parallel lamellar retouch (microblade scars)with maximum length of only 1.8 and 1.9 cm. To one carinated end-scraper (fig. 3:6) were refitted a twisted bladelet and a twisted microblade with no retouch showing both the formation of carinated pieces and twisted bladelet/microblade production in this assemblage. The first carinated end-scraper (fig. 3:6) is 3.4 cm long, 2.1 cm wide and 2.0 cm thick. The second carinated end-scraper (fig. 3:7) is 4.6 cm long, 2.9 cm wide and 2.2 cm thick.

A *thick shouldered end-scraper* (fig. 3:8) is on a broken blade. The end-scraper's front is narrow (1.0 cm wide) with a one-sided notch giving it a clear shouldered shape – similar to offset core morphology in plane, located on the blade's dorsal surface distal end and formed by convergent sub-parallel lamellar retouch (very narrow 0.2 – 0.3 cm microblade scars with maximum length 1.6 cm). The blade, as a blank, is a partially cortical distal fragment with significant cortex on both lateral edges and with unidirectional scar pattern, irregular shape, "on-axis" removal direction, incurvate distal general profile, blunt distal end, flat profile at midpoint. It is also 6.3 cm long, 2.7 cm wide and 2.4 cm thick.

A *flat shouldered end-scraper* (fig. 3:9) is on a complete wholly cortical flake. The end-scraper's front is of ogival-like general shape but with an additional clear left notch, giving it a particular shouldered shape. It is located on the flake's dorsal surface proximal end, formed by non-convergent sub-parallel retouch. The flake, as a blank, is also characterized by ovoid shape, "on-axis" removal direction, flat general profile, feathering distal end, crescent profile at midpoint and unidentifiable as retouched butt. It is 3.8 cm long, 2.2 cm wide and 0.9 cm thick.

Four *fragments of flat end-scraper working fronts* are the products of either intentional repreparation or breakage of the end-scrapers during manufacture and/or use.

Level Fc							
	gray flints%	**brown flints%**	**colored flints%**	**limestones%**	**TOTAL #**	**%**	**esse %**
Core-Like Pieces							
Core Maintenance Products	5 / 100%	0	0	0	5	7.9%	11.1%
Flakes	12 / 100%	0	0	0	12	19.1%	26.7%
Blades	7 / 100%	0	0	0	7	11.1%	15.6%
Bladelets	8 / 100%	0	0	0	8	12.7%	17.7%
Microblades	9 / 100%	0	0	0	9	14.3%	20.0%
Tools	3 / 75%	0	0	1 / 25%	4	6.3%	8.9%
Waste From Production & Rejuvenation of Tools	0	0	0	0	0		
Chips	10 / 100%	0	0	0	10	15.9%	
Uncharacteristic Debitage Pieces	8 / 100%	0	0	0	8	12.7%	
Chunks	0	0	0	0	0		
Heavily Burnt Pieces					0		
TOTAL	62 / 98.4%	0	0	1 / 1.6%	63	100.0	100.0
Level Fb1-Fb2							
	gray flints%	**brown flints%**	**colored flints%**	**limestones%**	**TOTAL #**	**%**	**esse %**
Core-Like Pieces	20 / 100%	0	0	0	20	0.3%	0.9%
Core Maintenance Products	153 / 97.5%	3 / 1.9%	1 / 0.6%	0	157	2.3%	6.9%
Flakes	412 / 97.4%	11 / 2.6%	0	0	423	6.1%	18.7%
Blades	111 / 100%	0	0	0	111	1.6%	5.0%
Bladelets	333 / 93.0%	1 / 0.3%	24 / 6.7%	0	358	5.2%	15.8%
Microblades	883 / 89.1%	5 / 0.5%	103 / 10.4%	0	991	14.4%	43.8%
Tools	143 / 94.2%	1 / 0.6%	7 / 4.6%	1 / 0.6%	152	2.2%	6.7%
Waste From Production & Rejuvenation of Tools	49 / 98%	0	1 / 2%	0	50	0.7%	2.2%
Chips	3767 / 96.9%	121 / 3.1%	0	0	3886	56.3%	
Uncharacteristic Debitage Pieces	177 / 96.2%	5 / 2.7%	2 / 1.1%	0	184	2.7%	
Chunks	17 / 85%	3 / 15%	0	0	20	0.3%	
Heavily Burnt Pieces					548	7.9%	
TOTAL	6065 / 95.4%	150 / 2.4%	138 / 2.2%	1 / 0.02%	6900	100.0	100.0
Level Fa3							
	gray flints%	**brown flints%**	**colored flints%**	**limestones%**	**TOTAL #**	**%**	**esse %**
Core-Like Pieces	2 / 100%	0	0	0	2	0.5%	0.8%
Core Maintenance Products	30 / 100%	0	0	0	30	7.4%	12.3%
Flakes	61 / 96.8%	0	2 / 3.2%	0	63	15.5%	25.8%
Blades	30 / 100%	0	0	0	30	7.4%	12.3%
Bladelets	52 / 94.6%	0	3 / 5.4%	0	55	13.5%	22.6%
Microblades	40 / 90.9%	0	4 / 9.1%	0	44	10.8%	18.0%
Tools	17 / 100%	0	0	0	17	4.2%	7.0%
Waste From Production & Rejuvenation of Tools	3 / 100%	0		0	3	0.7%	1.2%
Chips	122 / 95.3%	0	6 / 4.7%	0	128	31.4%	
Uncharacteristic Debitage Pieces	19 / 100%	0	0	0	19	4.7%	
Chunks	11 / 100%	0	0	0	11	2.7%	
Heavily Burnt Pieces					5	1.2%	
TOTAL	387 / 96.3%	0	15 / 3.7%	0	407	100.0	100.0
Level Fa1-Fa2							
	gray flints%	**brown flints%**	**colored flints%**	**limestones%**	**TOTAL #**	**%**	**esse %**
Core-Like Pieces	1 / 100%	0	0	0	1	0.5%	0.8%
Core Maintenance Products	13 / 100%	0	0	0	13	6.3%	9.9%
Flakes	41 / 97.6%	0	1 / 2.4%	0	42	20.5%	32.1%
Blades	12 / 92.3%	0	1 / 7.7%	0	13	6.3%	9.9%
Bladelets	32 / 100%	0	0	0	32	15.6%	24.4%
Microblades	17 / 89.5%	0	2 / 10.5%	0	19	9.3%	14.5%
Tools	9 / 100%	0	0	0	9	4.4%	6.9%
Waste From Production & Rejuvenation of Tools	2 / 100%	0	0	0	2	1.0%	1.5%
Chips	50 / 94.3%	0	3 / 5.7%	0	53	25.8%	
Uncharacteristic Debitage Pieces	17 / 100%	0	0	0	17	8.3%	
Chunks	1 / 100%	0	0	0	1	0.5%	
Heavily Burnt Pieces					3	1.5%	
TOTAL	195 / 96.5%	0	7 / 3.5%	0	205	100.0	100.0

Table 49 - Siuren-I. Unit F. Artifacts Totals by Raw Material Types as Percentages of Each Type.

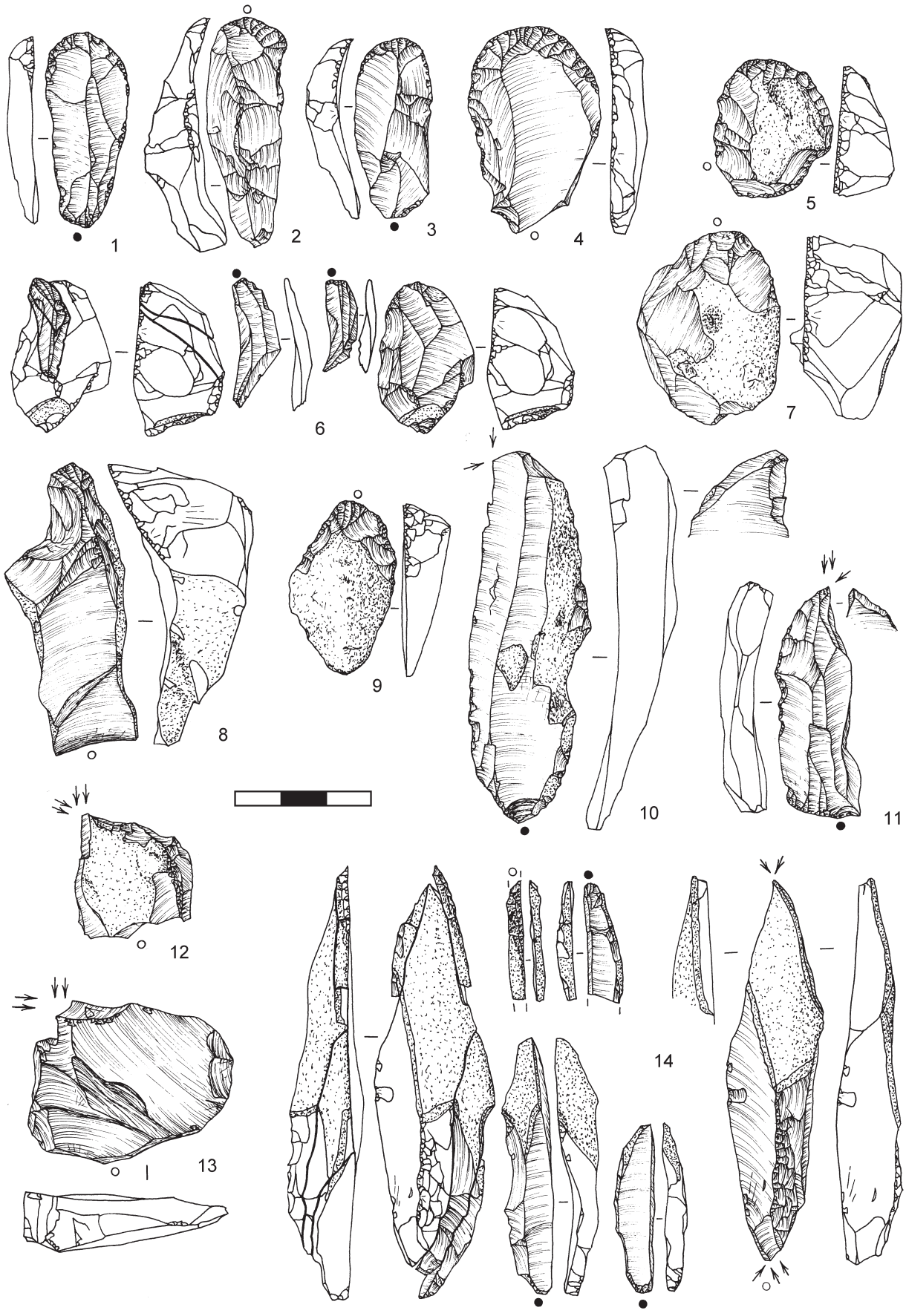

Figure 3 - Siuren I. Unit F, level Fb1-Fb2. Flint Artifacts – Tools. 1-4, simple flat end-scrapers; 5, circular end-scraper; 6, carinated end-scraper with refitted twisted bladelet and twisted microblade; 7, carinated end-scraper; 8, thick shouldered end-scraper; 9, flat shouldered end-scraper; 10-11, dihedral asymmetrical burins; 12-13, dihedral angle burins; 14, double dihedral symmetrical burin with 5 refitted burin spalls.

Burins include 2 dihedral asymmetric, 2 dihedral angle, 1 double dihedral symmetric, 1 carinated, 2 angle, 3 on truncation, 1 on lateral preparation and 1 broken specimens.

The two *dihedral asymmetric burins* (fig. 3:10-11) are made on complete blades of gray flint with some lateral/bilateral dorsal irregular retouch. Both pieces have burin terminations on the blades' distal ends and the asymmetric disposition of these burin terminations is connected to their formation by burin facets. The first blade (fig. 3:10), as a blank, is partially cortical with significant lateral cortex and unidirectional scar pattern, parallel shape, "on-axis" removal direction, incurvate medial general profile, unidentifiable as having burin facets distal end, trapezoidal profile at midpoint and linear (0.4 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion). It is 8.1 cm long, 2.6 cm wide and 1.1 cm thick. Additionally, the burin has reddish spots of ochre on both dorsal and ventral surfaces. The second blade (fig. 3:11), as a blank, is non-cortical with unidirectional scar pattern, parallel shape, "on-axis" removal direction, incurvate medial general profile, unidentifiable as having burin facets distal end, multifaceted profile at midpoint and plain (1.3 x 0.5 cm) butt (semi-lipped, semi-acute angle, with abrasion). It is 5.1 cm long, 1.7 cm wide and 0.8 cm thick.

Two *dihedral angle burins* (fig. 3:12-13) are made on broken flakes of gray flint. Their burin terminations are located on the distal ends formed by 2-3 transversal burin facets from which were then struck off 2-3 additional burin facets along one of the flakes' laterals edges. The first flake (fig. 3:12), as a blank, is a wholly cortical distal fragment with "on-axis" removal direction, blunt distal end, flat profile at midpoint and the following metrics: length – 2.8 cm, width – 2.7 cm and thickness – 1.3 cm. The second flake (fig. 3:13), as a blank, is a non-cortical distal fragment with incurvate medial general profile, hinged distal end and irregular profile at midpoint. It is 3.5 cm long, 4.4 cm wide and 1.2 cm thick.

A *double dihedral symmetric burin* (fig. 3:14) is on a complete blade of gray flint. Burin terminations are located on the two opposing proximal and distal blade ends. Each burin termination is symmetric, formed by only a single burin facet on each verge. So, this burin would appear to have had very simple and accurate secondary treatment. This is, however, not the case as there were refitted 5 burin spalls to 3 of 4 verges of this double dihedral burin, showing its "long reduction history and probable use". Moreover, only 2 of the 5 burin spalls morphologically correspond to characteristic "burin spall features" while 3 other burin spalls correspond well to morphological features of "regular" bladelets and microblades. This situation was already noted in Chapter # 9 ("Classification and attribute analysis system applied for Siuren I artifacts") as an example of the difficulty in distinguishing between burin spalls and "regular" bladelets and microblades, as well as problems understanding bladelet/microblade production in Unit F. Therefore, not only did carinated end-scrapers and burins *sensu lato* serve as "core-like sources" for bladelet/microblade primary reduction, but also some typologically "very regular burins" as well. The blade, as a blank, is a partially cortical secondary crested one (unilateral lateral partial crested ridge) with significant distal cortex and with "on-axis" removal direction, flat general profile and the following metrics: length – 8.5 cm, width – 1.9 cm and thickness – 1.3 cm.

A *carinated atypical burin* (fig. 4A:1) is made on an unidentifiable partially cortical flake of gray flint with insignificant distal cortex and the following metrics: length – 3.4 cm, width – 3.0 cm and thickness – 1.9 cm. A series of burin spalls (more than three) was struck off from a part of the natural acute surface (0.8 cm width) and, as this surface was not created by a burin facet, this carinated burin would be better considered as atypical.

The *first angle burin* (fig. 4A:2) is on a broken blade. The burin termination is on the blade's medial break from which a single narrow burin spall was struck off along ne lateral edge. The blade, as a blank, is a non-cortical distal fragment with unidirectional-crossed scar pattern, irregular shape, "off-axis" removal direction, incurvate medial general profile and triangular profile at midpoint. It is on gray flint, 4.5 cm long, 2.3 cm wide and 0.6 cm thick.

The *second angle burin* is on a complete blade. The burin termination is on the distal end of the blade from which two burin spalls were struck off along one lateral edge. The blade, as a blank, is partially cortical with significant lateral cortex and is morphologically characterized by unidirectional scar pattern, converging shape, "off-axis" removal direction, twisted general profile, unidentifiable as bearing burin facets distal end, trapezoidal profile at midpoint and crudely-faceted (1.5 x 0.7 cm) butt (semi-lipped, semi-acute angle, with abrasion). It is on gray flint, 5.1 cm long, 1.5 cm wide and 0.7 cm thick.

Three burins on truncation are typologically subdivided into two examples on oblique straight truncation (fig. 4A:3) and the third on oblique concave truncation (fig. 4A:4). The first burin on oblique straight truncation is on a broken blade with the burin termination formed by irregular dorsal retouch on the proximal end (butt area), from which 2 plain burin facets were struck off - 1 on the dorsal surface and 1 on the ventral surface of the blade. The blade, as a blank, is morphologically an unidentifiable small non-cortical proximal fragment on gray flint with the following metrics: length – 2.1 cm, width – 1.4 cm and thickness – 0.8 cm. The second burin on oblique truncation (fig. 4A:3) is on a complete blade with irregular dorsal retouch on one lateral edge. The burin termination is on the blade's proximal end (butt area), formed by scalar steep retouch and 1 burin spall was struck off from it. The blade, as a blank, is partially cortical with insignificant lateral cortex and is morphologically characterized by unidirectional-crossed scar pattern, expanding shape, "off-axis" removal direction, twisted general profile, feathering distal end and irregular profile at midpoint. It is on brown flint, 4.1 cm long, 1.8 cm wide and 0.6 cm thick. The burin on oblique concave truncation (fig. 4A:4) is produced on a complete non-cortical flake of gray flint with bilateral dorsal stepped steep retouch. The burin termination is on the flake's dorsal end, formed by scalar semi-steep retouch, from which 2 burin spalls were detached along one of the flake's retouched lateral edges. The flake, as a blank, has unidirectional scar pattern, unidentifiable shape, axis removal and distal end because of heavy retouch modification, twisted general profile, multifaceted profile at midpoint and plain (1.5 x 0.6 cm) butt (semi-lipped, semi-

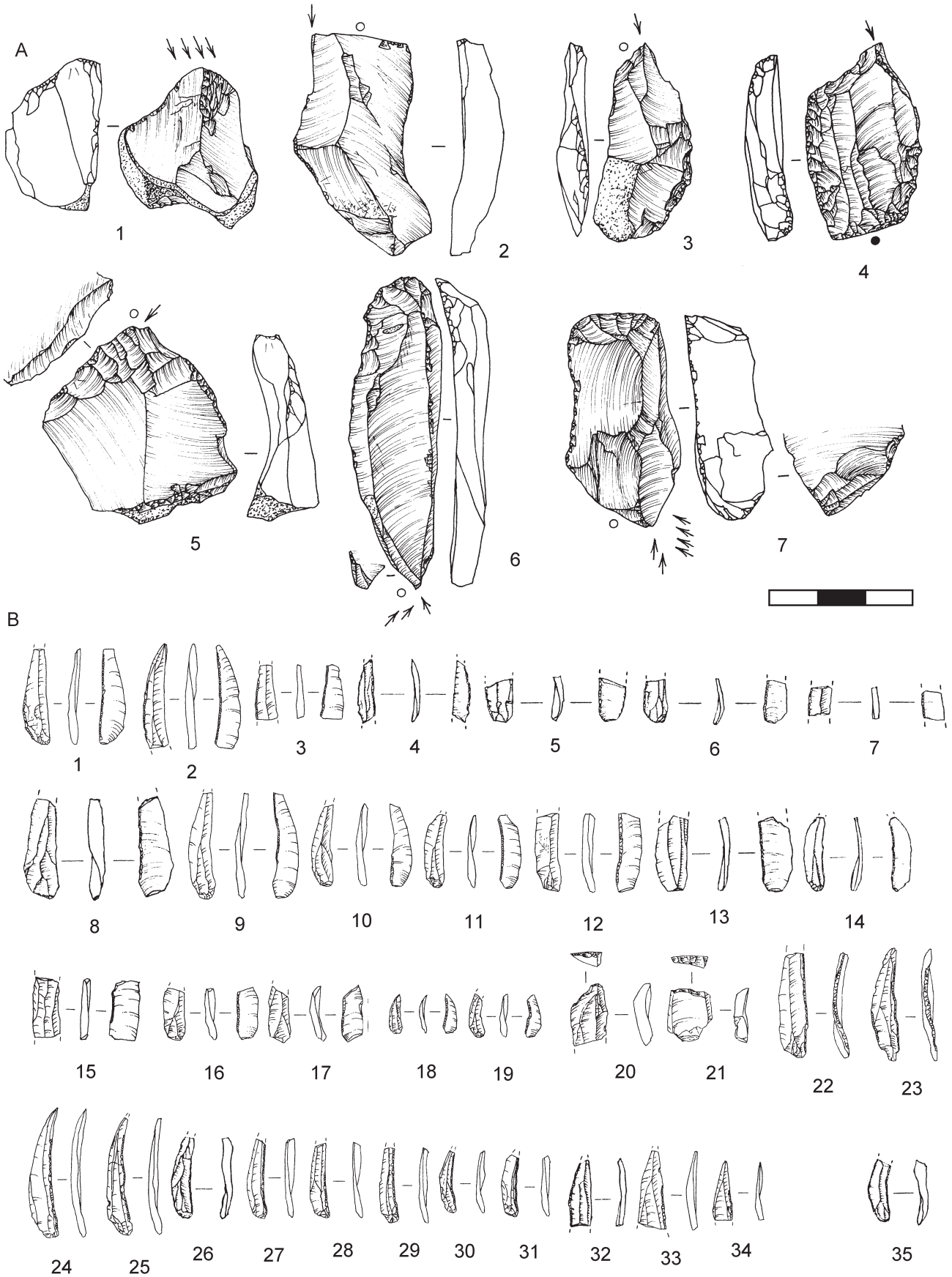

Figure 4 - Siuren I. Unit F, level Fb1-Fb2. Flint Artifacts – Tools. A: 1-7, Burins and Composite Tools. 1, carinated atypical burin; 2, angle burin; 3, burin on oblique straight truncation; 4, burin on oblique concave truncation; 5, burin on a lateral retouch; 6, simple end-scraper/dihedral asymmetrical burin; 7, simple end-scraper/carinated (busked) burin. B: 1-35, Non-Geometric Microliths. 1-7, Dufour type bladelets, on microblades with alternate retouch; 8-19, Dufour bladelets, on microblades with ventral retouch; 20-21, truncated bladelets; 22-23, backed microblades; 24-34, pseudo-Dufour type bladelets, on microblades with dorsal retouch; 35, pseudo-Dufour type bladelet, on microblade with bilateral dorsal retouch.

acute angle, with abrasion). It has the following metrics: length – 3.9 cm, width – 2.3 cm and thickness – 1.0 cm.

Burin on a lateral retouch (fig. 4A:5) is on a complete flake with a unique secondary treatment. The burin termination is on the flake's proximal end (butt area) bearing a burin facet struck off transversal to the axis of the flake from dorsal lateral concave preparation, formed by scalar steep retouch. Moreover, the burin facet's edge was additionally rather heavily retouched by scalar flat retouch on the flake's dorsal surface. The complex secondary treatment of this burin on lateral preparation could be explained as rejuvenation of an end-scraper by a "chamfer-like spall" with subsequent retouch modification that is observed on many "chamfered pieces" from levels XXV-XXII at Ksar Akil in Lebanon (Newcomer 1970:181, 186) and sometimes noted in European Upper Paleolithic contexts (see Otte 1979:153 for some Central European Gravettian assemblages with illustration of such a tool from Dolni Vestonice). The flake, as a blank, is partially cortical with insignificant distal cortex with only morphologically identifiable twisted general profile, blunt distal end and triangular profile at midpoint. It is on gray flint, 3.8 cm long, 3.4 cm wide and 1.5 cm thick.

A *broken burin* is made on a fragmented blade of gray flint with a clearly visible burin spall negative on one of its lateral edges, but absence of the burin termination makes its type identification impossible. The blade, as a blank, is a non-cortical medial fragment with unidirectional scar pattern and metrics: length – 3.6 cm, width – 1.9 cm and thickness – 0.7 cm.

Composite Tools. These include two end-scraper/burins. The first (fig. 4A:6) is a simple end-scraper/dihedral asymmetric burin on a complete blade. The end-scraper's working front is convex, formed on the blade's dorsal surface distal end by convergent sub-parallel semi-steep retouch. The burin termination is on the blade's proximal end, formed asymmetrically by 1 burin facet on each verge of the burin. The blade, as a blank, is non-cortical with only identifiable, because of its secondary treatment, unidirectional scar pattern, "off-axis" removal direction, twisted general profile and trapezoidal profile at midpoint. It is on gray flint, 6.5 cm long, 1.9 cm wide and 0.8 cm thick. The second composite tool (fig. 4A:7) is a simple end-scraper/carinated (busked) burin on a complete blade. The end-scraper's working front is convex, formed on the blade's dorsal surface distal end by convergent sub-parallel steep retouch. The burin termination is on the blade's proximal end and formed by 1 wide burin facet from which a series of burin spalls (more than 5) was then struck off oblique to the axis of the blade, making the burin's verge 1.0 cm wide. Moreover, the burin spall scars ended at a relatively poorly developed but nevertheless definite notch on the ventral surface of the blade, making its typological attribution not only carinated burin but busked as well. The blade, as a blank, is a truly secondary crested non-cortical one (no preserved crested ridge) with "on-axis" removal direction, flat general profile and irregular profile at midpoint. It is on gray flint, 4.6 cm long, 2.3 cm wide and 1.5 cm thick.

The *truncation* is oblique on a broken blade of gray flint. The truncated edge is formed by scalar dorsal retouch at the distal end of the blade. The blade, as a blank, is a non-cortical distal fragment with unidirectional scar pattern, "off-axis" removal direction, trapezoidal profile at midpoint and the following dimensions: length – 2.8 cm, width – 1.7 cm and thickness – 0.6 cm.

Notched Pieces. Both are lateral dorsal ones with a single notch each, formed by stepped steep retouch for one and scalar steep retouch for the other. The first piece, as a blank, is a partially cortical complete flake with insignificant proximal cortex and is characterized by unidirectional scar pattern, irregular shape, "on-axis" removal direction, incurvate distal general profile, overpassed distal end, multifaceted profile at midpoint and plain (2.9 x 0.4 cm) butt (semi-lipped, semi-acute angle, with abrasion). It is on gray flint, 3.5 cm long, 4.7 cm wide (shortened, transversal proportions) and 1.3 cm thick. The second piece, as a blank, is a partially cortical complete flake with insignificant proximal and distal cortex and is characterized by unidirectional scar pattern, irregular shape, "off-axis" removal direction, twisted general profile, blunt distal end, irregular profile at midpoint and plain (1.8 x 0.5 cm) butt (semi-lipped, semi-acute angle, with abrasion). It is on gray flint, 4.5 cm long, 3.2 cm wide and 0.7 cm thick.

The *Denticulated Piece* is a lateral straight one made on a complete flake of gray flint with alternate scalar flat retouch forming a rather light denticulated edge. The flake, as a blank, is non-cortical with dorsal-plain scar pattern, expanding shape, "on-axis" removal direction, convex general profile, hinged distal end, flat profile at midpoint, crushed butt and the following metrics: length – 2.7 cm, width – 3.8 cm (shortened, transversal proportions) and thickness – 0.9 cm.

Retouched Pieces. There are 21 retouched blades and 15 retouched flakes. Their further separate description will be done according to retouch characteristics and placement.

Retouched Blades are typologically subdivided into 15 items with marginal continuous, discontinuous and partial retouch, and 6 items with irregular partial retouch. Placement of these retouch types on the retouched blades is as follows: lateral dorsal – 14 pieces, lateral ventral – 1 piece, lateral and distal dorsal – 1 piece, bilateral dorsal – 3 pieces, bilateral ventral – 1 piece and bilateral alternate – 1 piece. Morphologically, all 21 retouched blades are characterized by the following features: 6 complete, 5 proximal, 5 medial and 5 distal; 20 non-cortical and 1 wholly cortical pieces; 1 cortical, 19 unidirectional and 1 unidentifiable scar patterns; 1 parallel, 5 converging, 2 irregular and 13 unidentifiable shapes; 3 "on-axis", 5 "off-axis" and 13 unidentifiable removal directions; 2 flat, 14 twisted and 5 unidentifiable general profiles; 6 feathering, 1 overpassed, 2 blunt and 12 unidentifiable distal ends; 4 triangular, 6 trapezoidal, 8 multifaceted, 1 crescent and 2 unidentifiable profiles at midpoint; 4 plain butts (4 semi-lipped, 4 semi-acute angles, 4 with abrasion) with dimensions in the following ranges: 0.9-0.3 x 0.8-0.2 cm, 3 punctiform butts (3 semi-lipped, 3 semi-acute angles, 2 with abrasion and 1 with no abrasion), 1 linear (0.8 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion), 3 crushed and 10 missing butts. All 21 retouched blades are on gray flint, including 4 burnt. Six complete blades have the following size ranges: length – 3.5-4.0 cm for 5 pieces and 8.1 cm for much longer sixth piece, width – 1.3-

1.6 cm and thickness – 0.2-0.5 cm. Fifteen broken blades have the following metric ranges: length – 1.7-3.9 cm, width – 1.2 -2.0 cm for 14 blades and 3.2 cm for one more exceptionally wide blade, thickness – 0.2-1.0 cm for 13 blades and more than 1.0 cm (1.1 and 1.2 cm) for two other blades.

Retouched Flakes are typologically characterized by 11 pieces with marginal continuous, discontinuous and partial retouch and 4 pieces with irregular partial retouch. Retouch type placement: lateral dorsal – 4 pieces, lateral ventral – 5 pieces, lateral alternating – 1 piece, distal dorsal – 4 pieces and distal ventral – 1 piece. Morphologically, all 15 retouched flakes are characterized by the following features: 13 complete, 1 medial and 1 longitudinally fragmented piece; 10 non-cortical and 5 partially cortical with only insignificant proximal (1), distal (1) and lateral (3) cortex; 2 dorsal-plain, 10 unidirectional, 2 bidirectional and 1 unidentifiable scar patterns; 2 parallel, 2 expanding, 1 ovoid, 8 irregular and 2 unidentifiable shapes; 1 "on-axis", 12 "off-axis" and 2 unidentifiable removal directions; 2 flat, 2 incurvate medial, 1 incurvate distal, 3 convex, 5 twisted and 2 unidentifiable general profiles; 10 feathering, 2 hinged and 3 unidentifiable distal ends; 2 flat, 5 trapezoidal, 4 multifaceted, 3 irregular and 1 unidentifiable profiles at midpoint; 2 plain butts (2 semi-lipped, 1 right and 1 semi-acute angles, 2 with abrasion) with the following sizes: 0.7-0.2 cm x 0.6 x 0.2 cm, 2 punctiform butts (2 semi-lipped, 2 semi-acute angles, 1 with abrasion and 1 with no abrasion), 3 linear butts (3 semi-lipped, 3 semi-acute angles, 2 with abrasion and 1 with no abrasion) having the following dimensions – 1.0-0.4 – 0.3 x 0.1 cm, 1 dihedral (0.9 x 0.2 cm) butt (semi-lipped, semi-acute angle, with abrasion), 1 butt with core tablet morphology, 5 crushed butts and 1 missing butt. All 15 retouched flakes are on gray flints including one of them burnt. Thirteen complete flakes have the following dimension ranges: length – 1.6-3.3 cm for 11 pieces and 4.9 cm and 6.4 cm for 2 more pieces; width – 1.4-3.2 cm for 12 pieces and 4.0 cm for one more piece (6 pieces have shortened, transversal proportions) and thickness – 0.2-0.7 cm. two broken flakes have the following metrics: length – 1.5 and 1.9 cm, width – 1.8 and 2.4 cm, thickness – 0.2 and 0.6 cm.

Unidentifiable Tool Fragments. There are 8 non-cortical pieces and a single piece with some cortex. In terms of raw material type, there are 8 pieces on gray flint, including 3 burnt, and one piece on colored flint, also burnt.

Non-geometric microliths. Non-geometric microliths of level Fb1-Fb2 are represented by 72 pieces, or 47.4 % of all tools. Non-geometric microliths are subdivided into: Dufour bladelet – 33 items (45.8 % of microliths); pseudo-Dufour bladelet – 31 items (43.1 %); microblade with micro-notch – 1 item (1.4 %); truncated pieces – 4 items (5.5 %); backed microblades – 3 items (4.2 %). While 6 microliths are on colored flints, the rest 66 microliths are on gray flints.

The *Dufour bladelet type, on microblades with alternate retouch* (fig. 4B:1-7) is represented by 8 pieces, or 11.1 % of non-geometric microliths. Microliths of this type have dorsal retouch on left edges and ventral retouch on right edges. Thirteen edges were made by continuous retouch. The other three edges were partially retouched. The majority of edges (14 items) have semi-abrupt retouch. The edges retouched by flat and abrupt retouch are represented each by a single item. The majority of edges (12 items) were produced by marginal retouch. Edges made by micro-scalar and stepped retouch are represented by 3 and 1 items. In sum, the continuous semi-abrupt marginal retouch combination is dominant – 9 edges. The other retouch combinations are represented by insignificant numbers of edges: continuous semi-abrupt stepped – 1; continuous semi-abrupt micro-scalar – 2; continuous abrupt marginal – 1; partial semi-abrupt marginal – 2; partial semi-abrupt micro-scalar – 1.

The *Dufour bladelet type, on microblades with ventral retouch* (fig. 4B:8-19) is represented by 25 pieces, or 34.7 % of non-geometric microliths. This is the most common type of non-geometric microlith. Fifteen are continuously retouched. Nine others are partially retouched and a single piece has discontinuous retouch. Also, 20 edges have semi-abrupt and 5 edges – flat retouched angles. Marginally retouched edges are clearly dominant – 16 of 25 edges, followed by edges with micro-scalar (7) and stepped (2) retouch. Overall, the most representative are continuous semi-abrupt marginal (8 edges) and partial semi-abrupt marginal (6 edges) combinations of retouch. The other retouch combinations are represented by a few edges each: continuous flat marginal – 1; continuous flat micro-scalar – 2; continuous semi-abrupt micro-scalar – 3; continuous semi-abrupt stepped – 2; discontinuous flat marginal – 1; partial flat micro-scalar – 2; and, partial semi-abrupt micro-scalar – 1.

The *Pseudo-Dufour bladelet type, on bladelets with lateral dorsal retouch* is composed of 3 pieces – 4.2 % of all non-geometric microliths. One has dorsal retouch on the left edge. The other two have dorsal retouch on the right edge. The left edge was produced by a partial flat micro-scalar retouch combination while the right edges were made by discontinuous semi-abrupt micro-scalar and partial flat micro-scalar combinations of retouch.

The *Pseudo-Dufour bladelet type, on microblades with dorsal retouch* (fig. 4B:24-34) is represented by 22 pieces, that is 30.5 % of non-geometric microliths. Two microblades have retouch on the left edge and 20 on the right edge. Continuously retouched edges comprise 13 items. Discontinuous and partial retouch were used for production of 1 and 8 edges. Flat retouch angles were defined for 3 edges; 19 other edges have semi-abrupt retouch angles. Marginally retouched edges comprise 14 items. Micro-scalar and stepped retouch were used for 7 and 1 edges. The majority of edges were produced by continuous semi-abrupt marginal (7) and continuous semi-abrupt micro-scalar (5) combinations of retouch. The other edges were made by the following retouch combinations: continuous flat marginal – 1; discontinuous semi-abrupt marginal – 1; partial flat marginal – 2; partial semi-abrupt marginal – 3; partial semi-abrupt micro-scalar – 2; partial semi-abrupt stepped – 1.

The *Pseudo-Dufour bladelet type, on microblades with bilateral dorsal retouch* (fig. 4B:35) is represented by 6 pieces, or 8.3 % of all non-geometric microliths. Six microliths have 12 retouched edges. Eight are partially retouched and four continuously retouched. Three edges have flat retouch angle and 9 edges are semi-abruptly retouched. Marginal (6) and micro-scalar (6) retouch are represented by the same number of edges. So, there are no

clearly dominant combinations of retouch among microliths of this type: continuous flat marginal – 1 edge; continuous semi-abrupt marginal – 1; continuous semi-abrupt micro-scalar – 2; partial flat marginal – 2; partial semi-abrupt marginal –2; partial semi-abrupt micro-scalar – 4.

Microblades with micro-notch are represented by 1 piece (1.4 % of non-geometric microliths). The micro-notch is produced by flat micro-scalar retouch on the dorsal side of the right edge.

Truncated bladelets (fig. 4B:20-21) are represented by 3 pieces – 4.2% of non-geometric microliths. The distal ends of these bladelets are truncated by continuous abrupt micro-scalar retouch.

Truncated microblades are represented by 1 piece (1.4 % of non-geometric microliths). The distal end of this microblade has a continuous abrupt stepped truncation.

Backed microblades (fig. 4B:22-23) are represented by 3 pieces or 4.2 % of non-geometric microliths. Two have dorsal continuous abrupt stepped retouch on the right edge. The third piece has both right and left retouched edges, the right edge produced by partial abrupt stepped retouch and the left by partial flat marginal retouch.

Sixty-six microblades and only six bladelets were used for non-geometric microlith production. The majority of blanks – 43 pieces (64.2% of all identifiable microliths) were removed "off-axis". "On-axis" blanks are represented by 24 pieces (35.8%). Five other pieces are unidentifiable for "axis" removal direction. Blanks with twisted profiles comprise 63 pieces (90% of all identifiable microliths). The other types of profiles are not rare: flat – 2 pieces; incurvate medial – 5; unidentifiable – 2. The most specific feature of blanks selected for non-geometric microliths production is the combination of attributes "profiles of blanks" and "axis of removal direction". All "off-axis" blanks (43 pieces) have twisted profiles. That is, about 60% of all, including unidentifiable items, non-geometric microliths were made on "off-axis" twisted blanks.

Eleven non-geometric microliths are complete. The longest is a truncated bladelet – 2.9 cm. Among the other non-geometric microliths on microblades the longest item is a pseudo-Dufour bladelet with dorsal retouch – 2.7 cm. The following complete pieces include 2 pseudo-Dufour bladelet on microblades with bilateral dorsal retouch – 2.5 and 2.3 cm long; a pseudo-Dufour bladelet with dorsal retouch – 1.1 cm; a backed microblade – 2.4 cm; a microblade with micro-notch – 1.8 cm; a truncated microblade – 1.0 cm; and 3 Dufour bladelet on microblades with ventral retouch – 1.5, 1.2 and 0.8 cm long.

Sixty eight non-geometric microliths (excluding four truncated pieces) are represented by 83 retouched edges. Continuously (47) and partially (33) retouched edges comprise the majority of edges with secondary treatment. Three other edges are discontinuously retouched. Semi-abrupt retouch angles are clearly dominant. Flat and abrupt edges are represented by 16 and 4 items. Marginally retouched edges (50) prevail over micro-scalar (27) and stepped (6) retouched edges. In sum, the most representative combinations of retouch are: continuous semi-abrupt marginal – 25 edges; continuous semi-abrupt micro-scalar – 12 edges; and partial semi-abrupt marginal – 13 edges. The other retouch combination variants are represented by insufficient numbers of edges: continuous flat marginal – 3; continuous flat micro-scalar – 1; continuous flat stepped – 1; continuous semi-abrupt stepped – 2; continuous abrupt marginal – 1; continuous abrupt stepped – 2; discontinuous flat marginal – 1; discontinuous abrupt marginal – 1; discontinuous semi-abrupt micro-scalar – 1; partial flat marginal – 5; partial flat micro-scalar – 5; partial semi-abrupt micro-scalar – 8; partial semi-abrupt stepped – 1; and, partial abrupt stepped – 1.

Non-flint tools. The single non-flint item is a retoucher on a tuff-like limestone pebble which was partially reconstructed through conjoining of six fragments with the following overall dimensions: length – 8.2 cm, width – 2.8 cm and thickness – 1.9 cm. It is identifiable by the presence of short shallow striations (small battering-like traces) on both tips and one lateral surface. Additionally, the retoucher has some ochre reddish spots on its surface.

Level Fa3

Tools include 17 specimens with subdivision into the four following groups: 1) indicative tool types – 5 pieces/29.4%; 2) retouched pieces – 6 pieces/35.3%; 3) unidentifiable tool fragments – 4 pieces/23.5%; 4) non-geometric microliths – 2 pieces/11.8%. Non-flint tools were not identified in the lithic assemblage of level Fa3.

Indicative tool types. These tools are represented by 1 end-scraper and 4 burins.

The *End-scraper* is a simple one (fig. 5:1) on a complete non-cortical blade of gray flint, 4.1 cm long, 2.0 cm wide and 0.5 cm thick. The end-scraper's working front is convex, formed on the blade's dorsal surface distal end by non-convergent scalar steep retouch. The blade, as a blank, has a unidirectional scar pattern, parallel shape, "on-axis" removal direction, incurvate medial general profile, unidentifiable as retouched distal end, trapezoidal profile at midpoint and linear (0.5 x 0.1 cm) butt (semi-lipped, semi-acute angle, with abrasion).

Burins. There are 2 dihedral, 1 double dihedral and 1 carinated specimens made on gray flint.

The *first dihedral burin* is an asymmetric one on a fragment of an unidentifiable non-cortical blank with the following metrics: length – 3.1 cm, width – 1.6 cm and thickness – 1.1 cm. The burin termination is formed asymmetrically by only 1 burin facet on each burin's verge.

The *second dihedral burin* (fig. 5:2) is a symmetric one on a broken blade. The burin termination is on the blade's distal end and formed by only 1 very narrow burin facet on each burin's verge. The blade, as a blank, is a non-cortical distal fragment with unidirectional scar pattern, "on-axis" removal direction and triangular profile at midpoint, and the following metrics: length – 3.6 cm, width – 1.5 cm and thickness – 0.7 cm.

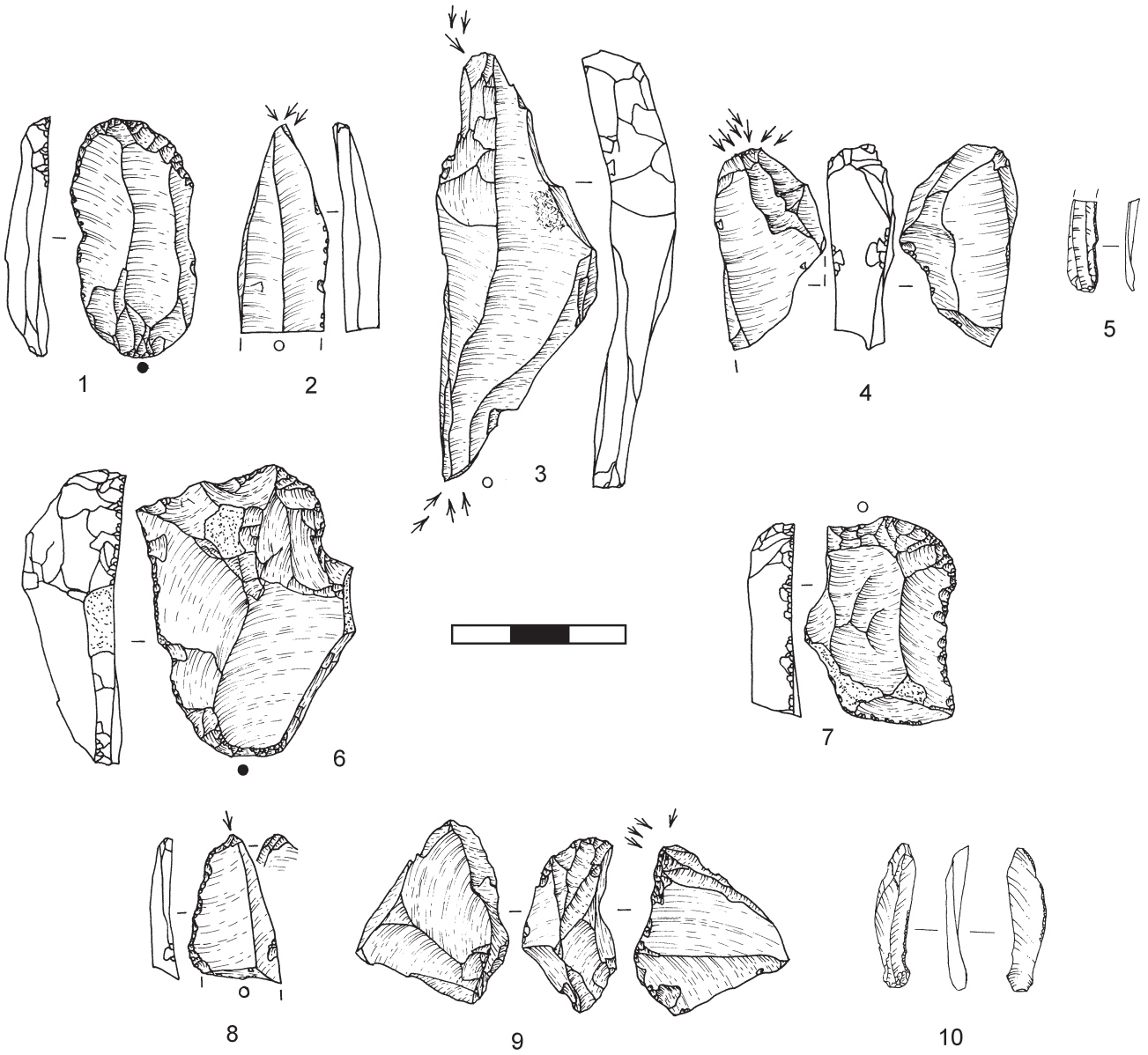

Figure 5 - Siuren I. Unit F, levels Fa3 and Fa1-Fa2. Flint Artifacts – Tools. 1, simple flat end-scraper (level Fa3); 2, dihedral symmetrical burin (level Fa3); 3, double dihedral asymmetrical burin (level Fa3); 4, carinated burin (level Fa3); 5, pseudo-Dufour type bladelet, on microblade with dorsal retouch (level Fa3); 6, thick shouldered end-scraper (level Fa1-Fa2); 7, flat shouldered end-scraper (level Fa1-Fa2); 8, burin on oblique concave truncation (level Fa1-Fa2); 9, carinated burin (level Fa1-Fa2); 10, Dufour type bladelet, on microblade with alternate retouch (level Fa1-Fa2).

The *double dihedral burin* is a double asymmetric one on a complete blade (fig. 5:3). The burin terminations are located on the two opposing proximal and distal ends. Each burin termination was formed by 2 burin facets on each of the 4 burin's verges. The blade, as a blank, is a complete non-cortical truly secondary crested one (no preserved crested ridge) with a limited number of identifiable morphological features because of intensive burin treatment – unidirectional scar pattern, twisted general profile and trapezoidal profile at midpoint. It is 7.4 cm long, 2.7 cm wide and 1.0 cm thick.

The *carinated burin* (fig. 5:4) is on a fragment of an unidentifiable non-cortical blank with the following dimensions: length – 3.5 cm, width – 1.8 cm and thickness – 1.2 cm. The burin termination is formed rather asymmetrically by a series of burin facets (no less than 5 with total maximum width of the verge of 0.9 cm) struck from another burin spall's negative detached along the burin's other verge. Both the burin's fragmentation and its heavy secondary treatment prevent identification of the original blank type used.

Retouched pieces. These items are represented by 1 blade with marginal partial retouch and 5 flakes with the following retouch types: 2 with marginal partial retouch and 3 with irregular continuous or partial retouch.

The *retouched blade* is a non-cortical distal fragment on gray flint (length – 1.4 cm, width – 2.0 cm, thickness – 0.5 cm) with distal dorsal retouch. Morphologically, it has an "off-axis" removal direction, feathering distal end and multifaceted profile at midpoint.

The *retouched flakes* are characterized by the following retouch: lateral dorsal – 1 piece, lateral ventral – 1 piece, distal dorsal – 2 pieces and distal ventral – 1 piece. Morphologically, these 5

retouched flakes are characterized by these features: all 5 complete; 3 non-cortical, 1 wholly cortical and 1 partially cortical with significant proximal cortex; 1 cortical, 1 lateral, 1 unidirectional, 1 unidirectional-crossed and 1 3-directional scar patterns; 2 expanding, 2 ovoid and 1 irregular shapes; 1 "on-axis" and 4 "off-axis" removal directions; 1 flat, 2 convex and 2 twisted general profiles; 3 feathering, 1 hinged and 1 unidentifiable distal ends; 1 flat, 1 triangular and 3 irregular profiles at midpoint; 2 plain (0.9 – 0.5 x 0.4 – 0.2 cm) butts (2 semi-lipped, 1 right and 1 acute angles; 2 with abrasion), 1 punctiform butt with no abrasion; 1 dihedral (1.6 x 0.4 cm) butt (semi-lipped, semi-acute angle, with no abrasion) and 1 crudely-faceted (1.8 x 0.5 cm) butt (semi-lipped, right angle, with no abrasion). All 5 retouched flakes are on gray flints. All 5 complete flakes have the following size ranges: length – 1.8-4.0 cm, width – 2.6-3.2 cm (3 pieces with shortened, transversal proportions) and thickness – 0.4-0.7 cm.

Unidentifiable tool fragments. These items are 3 non-cortical pieces and 1 more piece with some cortex on gray flint.

Non-geometric microliths. Two non-geometric microliths of only pseudo-Dufour type on gray flints were defined in artifact assemblage of this level.

Pseudo-Dufour bladelets on microblades with dorsal retouch (fig. 5:5) have secondary treatment on right edges. Both microblades were retouched by the same combination of retouch: continuous semi-abrupt marginal. The microblades, as blanks, are represented by proximal (length – 1.6 cm) and medial (length – 0.8 cm) fragments. Both have twisted general profile. The proximal fragment was removed "off-axis", while the medial one is too small to be identifiable for this attribute.

Level Fa1-Fa2

Tools are represented by 9 specimens that are subdivided into four groups: 1) indicative tool types – 5 pieces/55.5%; 2) retouched pieces – 1 piece/11.1%; 3) unidentifiable tool fragments – 1 piece/11.1%; 4) non-geometric microliths – 2 pieces/22.2%. Non-flint tools were not identified in the lithic assemblage of level Fa1-Fa2.

Indicative tool types. These tools include 2 end-scrapers, 2 burins and 1 truncation.

End-Scrapers. There are 1 thick shouldered and 1 flat shouldered specimens.

The *thick shouldered end-scraper* (fig. 5:6) is made on a complete and quite thick flake of gray flint. The end-scraper's front is convex and wide (4.0 cm) with a one-sided notch formed on the flake's dorsal surface distal end by non-convergent scalar steep non-lamellar retouch (chip scars). The flake, as a blank, is a partially cortical primary core tablet (a core striking platform remains on its butt area) with insignificant lateral and central cortex and the following size: length 5.0 cm, width 3.5 cm and thickness 1.8 cm.

The *flat shouldered end-scraper* (fig. 5:7) is made on a complete flake of gray flint. The end-scraper's front is convex with a one-sided notch produced on the flake's dorsal surface proximal end by non-convergent scalar steep retouch. The flake, as a blank, is partially cortical with insignificant distal cortex and has a unidirectional scar pattern, irregular shape, "on-axis" removal direction, incurvate medial general profile, blunt distal end, irregular profile at midpoint and unidentifiable as retouched butt. It is 3.6 cm long, 2.5 cm wide and 0.9 cm thick.

Burins. There are 1 on truncation and 1 carinated specimens.

The *gurin on truncation* (fig. 5:8) is an oblique concave one made on a broken blade of gray flint with lateral dorsal marginal ("micro-denticulated") continuous retouch. The burin termination is on the blade's distal end, has a single very narrow burin facet negative coming from the dorsal truncation, formed by light scalar steep retouch along the blade's unretouched lateral edge. The blade, as a blank, is a non-cortical distal fragment with unidirectional scar pattern and triangular profile at midpoint. It is 2.6 cm long, 1.5 cm wide and 0.4 cm thick.

The *carinated burin* (fig. 5:9) is on an unidentifiable non-cortical blank of gray flint. The burin termination is formed by a series of burin facets (no less than 5 with total maximum width of the verge of 1.0 cm) originating from the negative of a wide (1.0 cm) burin spall. It cannot be excluded, however, that this typologically carinated burin represents the final stage of a primary reduction of a bladelet core along one of its narrow edges and its exhausted state explains the unidentifiable character of the original blank used for its manufacture.

The *truncation* is a concave ventral one made on the proximal end of a broken blade of gray flint by scalar steep retouch. The blade, as a blank, is a non-cortical proximal fragment with unidirectional scar pattern, "off-axis" removal direction, twisted general profile, irregular profile at midpoint and dihedral (1.6 x 0.5 cm) butt (semi-lipped, right angle, with no abrasion). It is 3.6 cm long, 2.4 cm wide and 0.8 cm thick.

Retouched Piece. The single retouched piece is a complete non-cortical flake with irregular partial dorsal retouch at the distal end. The flake, as a blank, has unidirectional-crossed scar pattern, irregular shape, "off-axis" removal direction, incurvate medial general profile, feathering distal end, triangular profile at midpoint, crushed butt and is also 3.3 cm long, 2.3 cm wide and 0.7 cm thick, made on gray flint.

Unidentifiable Tool Fragment. An unidentifiable tool fragment is a non-cortical piece on gray flint.

Non-geometric microliths. Non-geometric microliths are represented in this level by only two pieces on gray flint.

The *Dufour bladelet type, on microblade with alternate retouch* (fig. 5:10) includes a single piece. The left edge of the microblade is ventrally retouched by partial flat micro-scalar retouch while the right edge is dorsally treated by partial semi-abrupt micro-scalar retouch. This microblade is a proximal (2.6 cm long), "off-axis", twisted profile fragment.

Bladelets with dorsal retouch at distal end are also represented by a single item. The distal end of this microlith is treated by partial

abrupt micro-scalar retouch. The bladelet, as a blank, is a complete 1.7 cm long piece, which was removed "off-axis" and has twisted profile.

Some summarizing data on the Unit F tool-kit

The summary is done in the same way as was done for the tools from Units H and G with, at the same time, an important comment on the complete absence of Middle Paleolithic tool types in Unit F assemblages.

There are no significant differences in flint type representation among the tool-kits between the four levels of Unit F. (tabl. 49). Gray flints dominate in all level – 100% for levels Fc, Fa3 and Fa1-Fa2 and 94.7% for level Fb1-Fb2. Some single brown and colored flints (5.3% altogether) among tools in level Fb1-Fb2 may be probably explained by more intensive habitation indices for the level, where flint exploitation was more "wide and deep" in use for level Fb1-Fb2, in comparison to the other three levels of Unit F.

By tool groups, Unit F tools taken together can be characterized as follows in terms of blank types. Indicative Tool Types (44 specimens) with 18 end-scrapers, 19 burins, 2 composite tools, 2 truncations, 3 notched and denticulated pieces show the following tendencies for the blanks in each tool class.

End-scraper types show a rather consistent situation with their blanks. Four of 5 simple end-scrapers and one atypical end-scraper are on blades and the fifth simple end-scraper is on a flake. One circular and both flat shouldered end-scrapers are on flakes, while one of two thick shouldered end-scrapers is on blade and another on a flake. The two carinated end-scrapers are on chunks. Finally, the single ogival end-scraper and all 4 fragments of flat end-scrapers' working fronts are unidentifiable in blank type. Accordingly, we see a diversity in blank types for 13 identifiable end-scrapers: 6 blades (46.1%), 5 flakes (38.5%) and 2 chunks (15.4%).

Burins also have a diversified blank type structure. On one hand, the most common types, with some prevalence of blades, also include flake blanks: 8 dihedral burins with 5 blades, 2 flakes and 1 unidentifiable blank; 5 burins on truncation/lateral preparation with 3 blades and 2 flakes. On the other hand, both angle burins are on blades and of the 3 carinated burins, the only identifiable blank is a flake. Finally, the single broken, typologically unidentifiable burin is on a blade as well. In total, there are twice as many blade blanks (11 items/68.75%) over flake blanks (5 items/31.25%) for all identifiable 16 burins.

Both composite tools (a simple end-scraper/dihedral asymmetric burin and a simple end-scraper/carinated (busked) burin) are on blades. The latter composite piece with a carinated burin is notable as no other carinated burin was made on a blade. Also, both truncations were made on blades, while all 3 notched and denticulated pieces are on flakes.

Summing up all blank data for identifiable Indicative Tool Types (35 specimens), we see the basic dominance of blades (21 items/60.0%), about a third flakes (12 items/34.3%) and a few chunks (2 items/5.7%). But noting the restriction of chunks to only carinated end-scrapers and production of 3 notched and denticulated pieces on only flakes, it is possible to state indeed the great prevalence of blade blanks over other blanks for Indicative Upper Paleolithic Tool Types. Adding blank data for Retouched Pieces (45 specimens) and Non-Geometric Microliths (77 specimens) to Indicative Tool types, we also obtain the following general tool blank data for Unit F tool-kits with a total number of 157 items. There are 44 blades (28.0%), 34 flakes (21.7%), 2 chunks (1.3%), 7 bladelets (4.4%) and 70 microblades (44.6%). At the same time, taking only 121 tool blanks with blady metric proportions, we obtain the following results: 36.4% blades, 5.8% bladelets and 57.8% microblades with the two latter categories together, as bladelets *sensu lato*, reaching 63.6%. Accordingly, these data on tool blanks allow us to propose the great role of bladelet *sensu lato* production and use by Siuren I Unit F Aurignacian groups with some certain differences in comparison to those characteristic of the Units H and G assemblages. Also, different blank selection rates should be considered: 34 possible flake-tools of all 632 flakes (5.4% of selection), 44 blade-tools of all 471 blades (16.9% of selection), 7 bladelet-tools of all 510 bladelets (1.4% of selection) and 70 microblade-tools of all 1172 microblades (6.0% of selection).

Finally, the fact that nearly 90% of all lithic artifacts of Unit F were recovered from level Fb1-Fb2 deserves special attention and consideration, although by basic artifact categories and tool types, all four levels of Unit F show very similar structures.

Waste from Production and Rejuvenation of Tools

Level Fb1-Fb2

This artifact category consists of 3 piece groups: burin spalls – 47 specimens; retouch chips – 2 specimens and "chamfer-like spalls" – 1 specimen.

Burin Spalls. Aside from one piece on colored flint, all the other 46 burin spalls are on gray flint, including 4 burnt. The description of burin spalls will be done separately for 42 burin spalls, none of which were refitted to any burins, and for 5 other burin spalls which were refitted onto the double dihedral symmetric burin (fig. 3:14).

The 42 unrefitted burin spalls are subdivided into 20 complete and 22 fragmented specimens.

The complete burin spalls include 14 primary and 6 secondary pieces. Eleven complete primary burin spalls are simple unretouched ones. Five have crushed butts and 4 others have punctiform butts. Burin types from which these 9 complete primary simple unretouched burin spalls were detached are unknown. They have the following general profiles – 7 twisted, 2 incurvate medial and 2 convex, as well as the following dimension ranges: length – 1.1-2.0 cm, width – 0.1-0.4 cm, thickness – 0.1-0.4 cm. One complete primary simple unretouched burin spall has a finely-faceted butt (detached from a burin on truncation), twisted general profile and is 0.9 cm long, 0.2 cm wide and thick. The final complete primary simple unretouched burin spall has a plain butt (probably originating from an angle burin), twisted

general profile, length in 2.0 cm, width in 0.4 cm and thickness in 0.9 cm. Two more complete primary burin spalls have fine partial lateral retouch at its ridge. One has a punctiform butt (unclear burin type origin), twisted general profile and the following metrics: length – 1.0 cm, width and thickness – 0.2 cm. The second burin spall has a kind of linear butt that in reality is a breakage of the distal end of a blank from which this burin spall was struck off (fig. 6:1). Accordingly, it is certain that the burin spall came from an angle burin. It also has twisted general profile, length – 2.3 cm, width – 0.2 cm and thickness – 0.5 cm. The final complete primary burin spall (length – 3.9 cm, width – 1.0 cm, thickness – 1.2 cm) has lateral scalar/denticulated retouch at its ridge (evidence of its detachment during burin manufacture from a heavily retouched blank's lateral edge) and twisted general profile.

All 6 complete secondary burin spalls have negatives of previously struck off burin spalls and one also has lateral scalar partial retouch at its distal ridge. Five of these complete secondary burin spalls are characterized by unknown burin type origin (2 with crushed and 3 with punctiform butts), 3 twisted and 2 incurvate medial general profiles and the following metric ranges: length – 1.2-2.3 cm, width – 0.2-1.0 cm, thickness – 0.3-1.2 cm. Another complete secondary burin spall is characterized by specific butt and distal end treatment and, therefore, deserves special attention (fig. 6:2). This piece has a longitudinal facet on its generally plain butt from which 3 very short hinged burin spalls were detached along a burin's verge. So, this treatment shows that the burin spall under consideration was detached from a dihedral angle burin during continuous rejuvenation. Moreover, the burin spall's distal end has remains of a burin's truncation with light scalar steep retouch from which was struck off a short and long burin spall opposite three hinged ones from a dihedral angle burin termination. Thus, this particular burin spall gives us an opportunity to see evidence of a double dihedral angle + on truncation burin's secondary treatment at the site, when the edge of the truncated termination of the burin was removed as well during the dihedral angle termination's rejuvenation. This complete secondary burin spall also has an incurvate medial general profile and it is 6.7 cm long, 0.6 cm wide and 1.2 cm thick.

Twenty-two broken burin spalls are subdivided into 15 primary and 7 secondary pieces. Fifteen broken primary burin spalls are represented by 10 distal fragments, 3 medial fragments and 2 proximal fragments. 13 items with missing butts (the distal and medial fragments) are of unknown burin type origin, as well as another piece with punctiform butt. The proximal fragment with plain butt was probably detached from an angle burin. All 15 broken primary burin spalls are also subdivided into simple unretouched ones (8 specimens) and with lateral retouch at their ridge (7 specimens). They have the following general profiles: 1 flat, 3 incurvate medial, 1 incurvate distal, 2 convex, 6 twisted and 2 unidentifiable types. Their dimension ranges are as follows: length – 0.7-2.7 cm, width – 0.1-0.6 cm and thickness – 0.2-1.0 cm. Seven broken secondary burin spalls are represented by 5 proximal and 2 medial fragments. Five proximal fragments have 3 crushed butts (unknown burin type origin), 1 plain butt and 1 crudely-faceted butt, and the two latter pieces, aside from negatives of previously removed burin facet typical for secondary spalls, have some lateral partial retouch at the ridge. These 5 proximal fragments of secondary burin spalls are also characterized by 1 flat, 1 incurvate medial, 2 twisted and 1 unidentifiable general profiles, and the following metric ranges: length – 1.7-2.6 cm, width – 0.4-0.8 cm, thickness – 0.5-1.5 cm. It is worth noting in a more detailed way the crudely-faceted butt on the proximal fragment of one of these five secondary burin spalls (fig. 6:3). This butt shows 4 small negatives of facets struck off longitudinally to the butt orientation. The butt's treatment, along with no less than 2 hinged facet scars at the edge of the burin spall (the lateral verge of a burin), allows us to interpret the burin spall as one that was removed during radical rejuvenation of a carinated burin with a number of burin facets.

Now let us describe the arrangement, removal order, morphology and metrics of the five refitted burin spalls which were struck from the double dihedral symmetric burin (fig. 3:14). First, the burin should be oriented in accordance with its proximal and distal ends' disposition. Two complete burin spalls (removed one after another) were refitted onto a single negative of the verge that goes from the burin termination at the proximal end. No burin spall was refitted, however, onto another verge of this burin termination with two facet scars, because of the very short length of these scars. The two refitted burin spalls have the following particular features which morphologically exclude them strictly typologically from traditionally recognized burin spalls. The first has a punctiform butt with abrasion, incurvate medial general profile, 3.7 cm long, 0.9 cm wide and 0.4 cm thick. The second piece looks exactly like a core tablet on bladelet with core-like striking platform remains on its butt area and it also has incurvate medial general profile and the following metrics: length – 5.6 cm, width – 1.1 cm and thickness – 0.8 cm. Thus, morphologically, the first piece is a typical "regular" bladelet and the second piece is a core tablet. Unfortunately, at least one more burin spall struck off before the first of these two refitted spalls was not found and refitted to show the initial stage of this burin verge's manufacture/reduction. But this is the case for another burin termination (at the distal end) where onto a single negative of one verge were successively refitted both burin spalls. The first is a proximal fragment of a morphologically truly primary burin spall with lateral fine partial retouch at its ridge, punctiform butt (no abrasion), unidentifiable as fragmented general profile, 1.5 cm long, 0.3 cm wide and 0.5 cm thick. This piece fits onto the second and final burin spall removal from this burin's verge which morphologically is an exact copy of the first of the two burin spalls discussed above –punctiform butt with abrasion and incurvate medial general profile, 2.7 cm long, 0.7 cm wide and 0.3 cm thick. It should also be noted that this is the proximal part of the burin spall conjoined from proximal and medial fragments. Another burin spall was also refitted onto another verge of the second burin termination. This is a proximal part (conjoined from proximal and medial fragments) of a truly primary burin spall with lateral fine partial retouch at its ridge, crushed butt, flat general profile and the following metrics: length – 2.6 cm, width and thickness – 0.3 cm each. It is worth noting that this burin spall is the only spall struck from this verge. The arrangement of these three refitted burin spalls on the second burin termination shows that the last described burin spall was struck

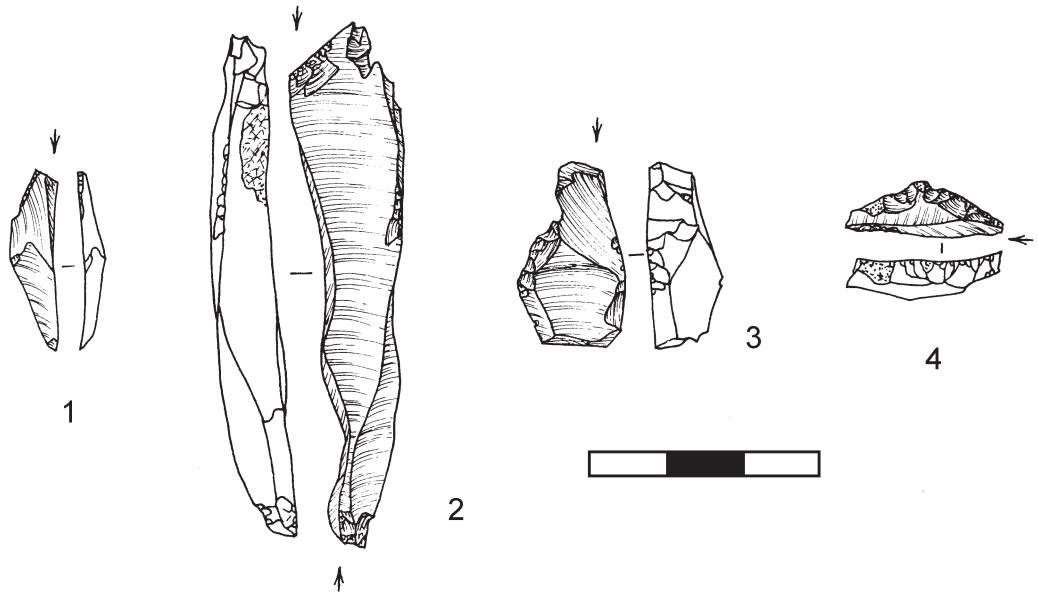

Figure 6 - Siuren I. Unit F, level Fb1-Fb2. Flint Artifacts – Tool Waste. 1, complete primary burin spall from an angle burin; 2, complete secondary burin spall from a mixed burin – double dihedral angle and on truncation; 3, proximal fragment of a secondary burin spall from a carinated burin; 4, "chamfer-like spall".

first and only then the two other burin spalls detached from the another verge.

Thus, a "summa summarum" of the burin spalls' arrangement and order of refitting for the double dihedral symmetric burin can be made as follows. First, according to both negatives of all burin spalls (including two missing in refitting for the first burin termination at the proximal end) and the arrangement and order of the refitted burin spalls, at least 8 burin spalls in total were struck off from 4 burin's verges instead of only 5 detached spalls, which would take into account only the negatives on the burin's verges. Second, the initial manufacture of all burin's verges took place with the same technology – by removing primary spalls with lateral fine retouch at their ridges (so-called "micro-crested" bladelets and microblades), whose butts (crushed and punctiform) do not show any visible indications of their detachment from a dihedral burin. Third, further manufacture became a kind of bladelet production with application of technological reception as butt abrasion and core tablet technique. Accordingly, this second stage of burin manufacture produces morphologically and metrically (width is always bigger than thickness) not burin spalls but rather both "regular" bladelets *sensu lato* and core tablets. So, this refitted block (the burin itself and its burin spalls) gives us an opportunity to conclude that unrefitted burin spalls morphologically identified by us are limited to supposedly almost all primary items and to just part of only very evident secondary items, when some of the latter specimens are placed in the category of "regular" bladelets/microblades and core tablets on bladelets. This is really true for our real classification of level Fb1-Fb2 unrefitted burin spalls: 29 primary and 13 secondary spalls. If we do not focus a "very strong morphological eye" at secondary burin spalls, another much more complicated danger appears – no morphological "borders" between "regular" bladelets/microblades and secondary burin spalls and many "regular" bladelets/microblades would be placed into the category of burin spalls. The latter possibility would make the structure of small debitage different and with no good typological grounds, especially when we keep in mind the intensive production of bladelets/microblades from mainly carinated pieces (cores, end-scrapers and burins).

Retouch Chips. These two pieces are non-cortical complete ones on gray flint. They have plain butts with lipping, acute angle and intensive abrasion. Taking into consideration their morphology and tools' structure of level Fb1-Fb2, it is probable that they-retouch chips originated from secondary retreatment of end-scrapers.

"Chamfer-like Spall". This piece represents the tip of an end-scraper's working front with scalar steep retouch removed by a transversal "chamfer-like" blow during rejuvenation of an end-scraper's front (fig. 6:4). The quite unusual rejuvenation by-product seems not to be an occasional piece as we have already observed a similar "chamfer-like" rejuvenation method for the burin on lateral preparation in level Fb1-Fb2 (fig. 4A:5). The spall is on gray flint, 2.0 cm long, 0.5 cm wide and 0.7 cm thick.

Level Fa3

This artifact category consists of only burin spalls – 3 specimens.

Burin Spalls. There are 2 complete and 1 broken pieces on gray flint. Both complete items are primary simple unretouched ones with twisted general profiles. One has a finely-faceted butt that may indicate its detachment from a burin on truncation/lateral retouch, and with the following metrics: length – 3.0 cm, width – 0.8 cm and thickness – 0.9 cm. The second complete burin spall (length – 2.9 cm, width – 1.2 cm, thickness – 0.3 cm) has a plain butt suggesting an origin from an angle burin. The broken burin spall (distal fragment) is a secondary one with a previously removed burin spall scar, has no butt and thus unclear burin type origin, twisted general profile and the following dimensions: length – 3.3 cm, width – 1.1 cm and thickness – 2.8 cm.

Level Fa1-Fa2

Only 2 burin spalls are identified for the artifact category in this level.

Burin spalls. Both burin spalls are complete ones on gray flint. The first is a primary one (length – 1.9 cm, width – 0.5 cm, thickness – 0.6 cm) with lateral scalar steep retouch, removing a blank's retouched edge during burin manufacture, with a punctiform butt (unclear burin type origin) and incurvate medial general profile. The second burin spall is a secondary one both with three burin spalls' negatives and some retouch at its distal ridge. It has a crushed butt (unclear burin type origin), twisted general profile and the following dimensions: length – 3.5 cm, width – 0.6 cm and thickness – 0.7 cm.

Debris

Chips, uncharacteristic debitage pieces and chunks are only analyzed through presence/absence of cortex and raw material types, whereas heavily burnt pieces are only counted.

Chips

This artifact category is represented as follows in each level of Unit F:

- 10 pieces in level Fc;
- 3886 pieces in level Fb1-Fb2;
- 128 pieces in level Fa3;
- 53 pieces in level Fa1-Fa2.

The following numbers of chips have some cortex:

- 2 pieces (20%) in level Fc;
- 276 pieces (7.1%) in level Fb1-Fb2;
- 11 pieces (8.6%) in level Fa3;
- 5 pieces (9.4%) in level Fa1-Fa2.

Raw material types for chips are as follows.

Gray flints:
- all 10 pieces (100%), 2 (20%) of which have some cortex in level Fc;
- 3767 pieces (96.9%), 274 (7.3%) of which have some cortex in level Fb1-Fb2;
- 122 pieces (95.3%), 9 of them (7.4%) of which have some cortex in level Fa3;
- 50 pieces (94.3%), 5 of them (10%) of which have some cortex in level Fa1-Fa2.

Brown flints occurred only in level Fb1-Fb2:
- 121 pieces (3.1%), 2 (1.7%) of which have some cortex.

Colored flints are noted in levels Fa3 and Fa1-Fa2:
- 6 pieces (4.7%), 2 (33.3%) of which have some cortex in level Fa3;
- 3 pieces (5.7%), none with cortex in level Fa1-Fa2.

Uncharacteristic Debitage Pieces

These pieces are represented as follows in each level of Unit F:

- 8 pieces (all on gray flint) in level Fc;
- 184 pieces in level Fb1-Fb2;
- 19 pieces (all on gray flints) in level Fa3;
- 17 pieces (all on gray flints) in level Fa1-Fa2.

Uncharacteristic debitage pieces with some cortex are as follows by level:

- 1 piece (12.5%) in level Fc;
- 40 pieces (21.7%) in level Fb1-Fb2;
- 3 pieces (15.8%) in level Fa3;
- 6 pieces (35.3%) in level Fa1-Fa2.

While uncharacteristic debitage pieces exclusively occur on gray flint in levels Fc, Fa3 and Fa1-Fa2, the following pieces in level Fb1-Fb2 are characterized by three raw material types.

Gray flint:
- 177 pieces (96.2%), 39 (22%) of which have have some cortex.

Brown flint:
- 5 non-cortical pieces (2.7%).

Colored flints:
- 2 pieces (1.1%), 1 (50%) of which has some cortex.

Chunks

Chunks are represented as follows in each level of Unit F:

- none in level Fc;
- 20 pieces in level Fb1-Fb2;
- 11 pieces on gray flints of which 2 specimens (18.2%) have some cortex in level Fa3;
- 1 non-cortical piece on gray flint in level Fa1-Fa2.

Raw material type representation for chunks of level Fb1-Fb2 is as follows.

Gray flint:
- 17 pieces (85%), 12 (70.6%) of which have some cortex.

Brown flint:
- 3 pieces (15%), 1 (33.3%) of which has some cortex.

Heavily Burnt Pieces are represented by the following in each level of Unit F:

- none in level Fc;
- 548 pieces in level Fb1 - Fb2;
- 5 pieces in level Fa3;
- 3 pieces in level Fa1-Fa2.