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SIUREN-I, AN AURIGNACIAN SITE IN THE CRIMEA (THE INVESTIGATIONS OF THE 1994 - 1996 FIELD SEASONS)

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INTRODUCTION

The Crimean peninsula (northern Black Sea region) is well known in prehistoric studies because of its numerous Paleolithic sites. At the same time, the site representation and context of the Middle and Upper Paleolithic periods are strikingly different. The Middle Paleolithic is mainly known for its many deeply stratified multilayer sites with abundant artifacts, fauna, and even some human remains. Many fundamental ideas concerning Middle Paleolithic chronology and industrial variability were elaborated on the basis of this wealth data (e.g., Kolosov, Stepanchuk, and Chabai 1993; Chabai, Marks, and Yevtushenko 1995). On the other hand, the Upper Paleolithic is very poorly represented by only a few sites and their analyses are quite limited. Although the reasons for such a different representation of the Middle and Upper Paleolithic in the Crimea is an important question, it is worth noting that almost all known sites are located in the Second range of the Crimean mountains. So, it has become clear that we should also be concerned with the possible relations between Middle and Upper Paleolithic industries. First of all, this means the consideration of problems regarding the Middle/Upper Paleolithic transition through more detailed studies of the Late Middle Paleolithic and Early Upper Paleolithic. The most promising Middle Paleolithic industries in this respect are the upper levels of Unit II of the site of Kabazi-II. The industrial features of these assemblages (namely clear blade primary flaking) and absolute dates (about 30,000 BP) shed new light on the Late Middle Paleolithic and are directly related to transitional problems (Chabai 1996). On the other hand, the single-known Early Upper Paleolithic site, Siuren-I, could also contribute to the resolution of these problems. Despite a number of different interpretations concerning its assemblages and chronology (see below), it was obvious that two of its layers contain Aurignacian-like industries and that the lower layer is, in addition, characterized by some Middle Paleolithic tool types as well. Therefore, in 1993, a joint Ukrainian-Belgian project was organized for the investigation of this important site.

LOCATION OF SIUREN-I

The site is situated near the high road from Bakchisarai to Yalta, 0.5 km from the village of Tankovoe (formerly Biuk-Siuren), 13 km south of the town of Bakchisarai, western Crimea. It is one of two rock-shelters (Siuren-II is a Late Paleolithic site) which are located on the right bank of the Belbek river, at its narrowest point (the so-called "Belbek Gate") where it

cuts through the cliffs of the Second range of the Crimean Mountains. Siuren-I is a large south-facing rock-shelter, 43 m wide, 15 m deep, and 9-10 m high with an elevation of 15-17 m above the current level of the Belbek River.

HISTORY OF INVESTIGATIONS AT SIUREN-I

The site was discovered and first excavated by the pioneer of Crimean Stone Age archaeology, K. S. Merejkowski, from 1879-1880. He carried out his excavations in the central part of the rock-shelter on an area of about 60 sq. m. and recognized two Paleolithic cultural layers in Pleistocene deposits. Although K.S. Merejkowski partly published the materials from his excavations of Siuren-I (Merejkowski 1881, 1887; see also Vekilova 1957:237-238), these publications were not quite scientifically valid and mainly just pointed out the importance of this large Paleolithic rock-shelter.

More detailed investigations of Siuren-I were undertaken almost 50 years later under the direction of G.A. Bonch-Osmolowski (1934:148-155) during four field seasons, from 1926 to 1929. G.A. Bonch-Osmolowski concentrated his excavations in the western part of the rock-shelter. On the whole, he investigated an area of about 120 sq. m.. The entire stratigraphic sequence of the site was composed of 9 m of deposits, in which G.A. Bonch-Osmolowski recognized seven geological strata. The middle Strata 2-4, with Upper Paleolithic remains, are archaeologically significant while the upper Stratum 1 (about 0.2 m thick) contained only modern sediments and the lower Strata 5-7 (the basal three meters of the sequence above bedrock) did not contain any archaeological remains at all. Stratum 2, which was excavated over a 120 sq. m area, contained *Upper cultural layer*; Stratum 3 (excavated over a 95 sq. m area) contained *Middle cultural layer*; and Stratum 4 contained *Lower cultural layer* (excavated over an 85 sq. m area). Stratigraphically, it was noted that these three strata were composed of basically the same gray limy sand with abundant limestone slabs and fragments, and were separated from each other by huge limestone blocks - representing different rock falls from the roof of the shelter. While G.A.Bonch-Osmolowski distinguished several horizons for each cultural layer on the basis of the thickness of the deposits and the presence of hearth/ashy lenses of different depths, he combined all finds from each layer together because of the rather homogeneous character of the flint artifacts and his strong belief that deposition occurred rapidly.

G.A. Bonch-Osmolowski also classified the lithic assemblages of Siuren-I into three stages of a subdivision of the Crimean Aurignacian (Bonch-Osmolowski 1934:148-154). The presence of some Middle Paleolithic tool types, a "Chatelperron" point, core-like endscrapers, and bladelets with fine retouch in the Lower layer prompted him to name this assemblage Lower Aurignacian, and connected with the Middle Paleolithic. The Middle layer was attributed to the Middle Aurignacian on the basis of typical *grattoirs carénés* and *burins busqués*. The Upper layer was called Upper Aurignacian as it contained Gravette points and backed bladelets. Such an interpretation of the Siuren-I Upper Paleolithic assemblages was traditional at that time for European Paleolithic archaeology and was based on the French Aurignacian subdivisions defined by Abbé H. Breuil early in this century. Thus, G.A. Bonch-

Osmolowski placed the Siuren-I Upper Paleolithic in a European context. During the excavations, along with archaeological artifacts and a human (*Homo sapiens*) molar found in the Lower layer, the stratigraphic profiles were also investigated and samples were systematically collected for paleobotanical, faunal, and microfaunal studies. The results of these studies were used after World War II for determining the chronology of Siuren-I's Upper Paleolithic layers.

Subsequently, in the 1950s, E.A. Vekilova, despite Bonch-Osmolowski's rather brief description of the site's excavations and collections, thoroughly studied all Siuren-I materials and published her results in great detail for that time (Vekilova 1957). This publication is the main source for Siuren-I before ours in the 1990s. Vekilova took a very different view of the Siuren-I Upper Paleolithic assemblages. She considered them not as Aurignacian, but as representing the entire developmental sequence of the Crimean Upper Paleolithic. Vekilova saw the closest analogies for the Siuren-I Upper Paleolithic not in the West, as G.A. Bonch-Osmolowski did, but instead in the East - the Trans-Caucasian region.

This new look at the Siuren-I Upper Paleolithic was generally accepted by Soviet archaeologists. At that time, attention was mostly paid to the Lower layer, which contains some Middle Paleolithic tool types. Therefore, the Lower layer of Siuren-I was seen to relate to problems of the Middle/Upper Paleolithic transition (e.g., Anikovich 1992:223-225).

It is worth noting that none of the Soviet archaeologists, as well as some Western specialists (e.g., Hoffecker 1988:251, 262), after Bonch-Osmolowski's interpretation, really considered the Siuren-I Upper Paleolithic as Aurignacian and connected to the European Aurignacian. This is best illustrated by M.V. Anikovich's descriptions of the Lower and Middle layer assemblages, where he did not classify even a single tool as Aurignacian (Anikovich 1992:224) and related these assemblages only generally to the "Aurignacoid route" of Upper Paleolithic development (1992:242).

On the other hand, archaeologists with good knowledge of the Central European Upper Paleolithic, such as J.K. Kozlowski and J. Hahn, identified the Lower and Middle layer assemblages of the Siuren-I Upper Paleolithic as Aurignacian of Krems-Dufour type and classified them in the framework of the Aurignacian of Central and Eastern Europe (Kozlowski 1965:38-40; Kozlowski and Kozlowski 1979:30-39; Hahn 1977:141-142).

The chronological determinations of the Siuren-I Upper Paleolithic were also controversial. First, V.I. Gromov attributed the Siuren-I Upper Paleolithic deposits to the maximum and post-maximum phase of the Riss Glacial on the basis of the great quantity of fresh limestone slabs, cold-loving faunal species, and paleobotanic data (Gromov 1948:248-250). Then, after the common recognition of the Last Glacial (Würm) time span for the Upper Paleolithic in Soviet archaeology, I.K. Ivanova, using the same data base as V.I. Gromov, concluded that the Siuren-I Upper Paleolithic is related to "cold, probably the post-Paudorf period of the Würm time" (Ivanova 1969:34).

This late date for the Upper Paleolithic from Siuren-I was fully accepted by M.V. Anikovich. His conclusions are as follows: "The lower and middle horizons (*of Siuren-I - the*

present authors) were close in time and date to a marked cold spell... it seems most likely that the lower and middle horizons date to the maximum cold of the Upper Valdai (ca.20,000-18,000 BP)" (Anikovich 1992:223-224). Moreover, accepting such chronological determinations, Anikovich further concluded that "the likely geological age of the lower and middle layers suggests that the Middle-Upper Paleolithic transition occurred in the Crimea much later than in most of Europe" (Anikovich 1992:225). Finally, we should mention the very limited (ca. 4 sq. m) excavations of the site's Upper Layer conducted by L.M. Tarasov in the early 1980s.

GOALS OF THE NEW EXCAVATIONS AT SIUREN-I

Taking into consideration the data and ideas presented above on the previous excavations at Siuren-I, as well as the interests of our project, the main goal of our new excavations at Siuren-I was the determination of the relationship of its Upper Paleolithic assemblages to the Middle/Upper Paleolithic transition problems. The following work needed to be accomplished in order to resolve this general question:

1) to choose an excavation area near Bonch-Osmolowski's main excavation block, appropriate for thorough and well stratigraphically controlled excavations and for comparisons with data from previous investigations;
2) to establish in detail the geological and archaeological stratigraphic sequences;
3) to sample artifacts from different levels from each cultural layer defined by G.A. Bonch-Osmolowski in order to determine whether or not they belong to the same or different techno-typological groups;
4) to determine whether the Middle Paleolithic tool types from the Lower cultural layer of Bonch-Osmolowski's excavations are part of the Upper Paleolithic assemblage or were mixed in from a previously unidentified Middle Paleolithic layer;
5) to obtain a sufficient faunal sample for each level and Unit for different analyses such as species presentation, taphonomy, seasonality, etc.;
6) to conduct detailed geological investigations through both profile descriptions and sampling of various lithological strata for sediment, pollen, microfauna and mollusks;
7) to obtain bone and charcoal samples for AMS dating.

With these goals in mind we started our new Siuren-I site investigations in 1994.

STRATIGRAPHY

The stratigraphy of the site was studied on the basis of five profiles (Fig. 1). The total thickness of the deposits studied is more than 6 m from the present day surface. Forty geological strata were recognized. The majority of the defined strata are present in profiles III and IV (Fig. 2).

Strata 1-3. Modern deposits.
Stratum 4. Yellowish-brown silty clay with rounded limestone *éboulis*. This stratum is present in profile I.
Stratum 4a. Limestone blocks (the first rock-fall horizon).
Stratum 5. Dark-brown sediments. This stratum is present in profile I.
Stratum 6. Yellowish-gray carbonated sediments. This stratum is present in profile I.
Stratum 7. Humused silty clay loam with a number of angular and sub-angular limestone pebbles and cobbles covered by carbonates.
Stratum 8. Limestone blocks (the second rock-fall horizon).
Stratum 8a. Yellowish-brown sandy clay loam with a number of carbonated limestone slabs and *éboulis* of different sizes.
Stratum 9. Yellowish-brown silty clay loam with small uncarbonated *éboulis*.
Stratum 9a. A lens of unsorted *éboulis*. It is present in profile II.
Stratum 9b. Yellowish-brown sediment with a number of limestone *éboulis* of different sizes. This stratum is present in profile I.
Stratum 9c. A lens of sorted and rounded *éboulis*.
Stratum 9f. Yellowish -brown clay sediment with *éboulis* of different sizes.
Stratum 10. Yellowish-brown silty clay with angular limestone slabs and *éboulis*.
Stratum 10a. A lens of sorted and rounded small *éboulis*.
Stratum 11. Light yellowish-brown granulated silt with sand and angular limestone *éboulis*.
Stratum 11a. Light yellowish-brown loamy sand with *éboulis* of different sizes.
Stratum 12. Yellowish-brown silty clay with rare *éboulis* of different sizes.
Stratum 12a. A lens of sorted and rounded small *éboulis* of sandstone, limestone, quartz, etc. These are alluvial sediments, probably from an ancient stream. This lens is present in profile II.
Stratum 12b. Yellowish-brown silty clay with limestone *éboulis* of different sizes. Present in the profile II.
Stratum 12c. A lens of sorted and rounded small *éboulis*.
Stratum 13a. White sand with *éboulis* of different sizes.
Stratum 13. Limestone blocks (third rock-fall horizon).
Stratum 14. Light yellowish sand with limestone *éboulis* of different sizes.
Stratum 15. Light brown sediment with a number of limestone angular slabs and *éboulis*.
Stratum 15a. A lens of unsorted *éboulis* of different sizes. It is present in profile II.
Stratum 15b. Limestone blocks. Present in profile I.
Stratum 15c. Densely deposited limestone slabs and blocks. Present in profile I.
Stratum 15d. Brown sandy sediment with a number of different-sized limestone slabs and *éboulis*.
Stratum 15e. Limestone blocks (the fourth rock-fall horizon).
Stratum 16. Light yellowish sandy sediment with a number of slabs and *éboulis*.
Stratum 17. Dark yellowish-brown clay with rare limestone *éboulis*.
Stratum 18. Yellowish-brown sandy sediment.
Stratum 19. Limestone blocks (the fifth rock-fall horizon).
Stratum 20. Brown clay with rounded slabs.

The majority of strata are lenses with limited spatial distribution. Usually, they were not present in the entire excavation area.

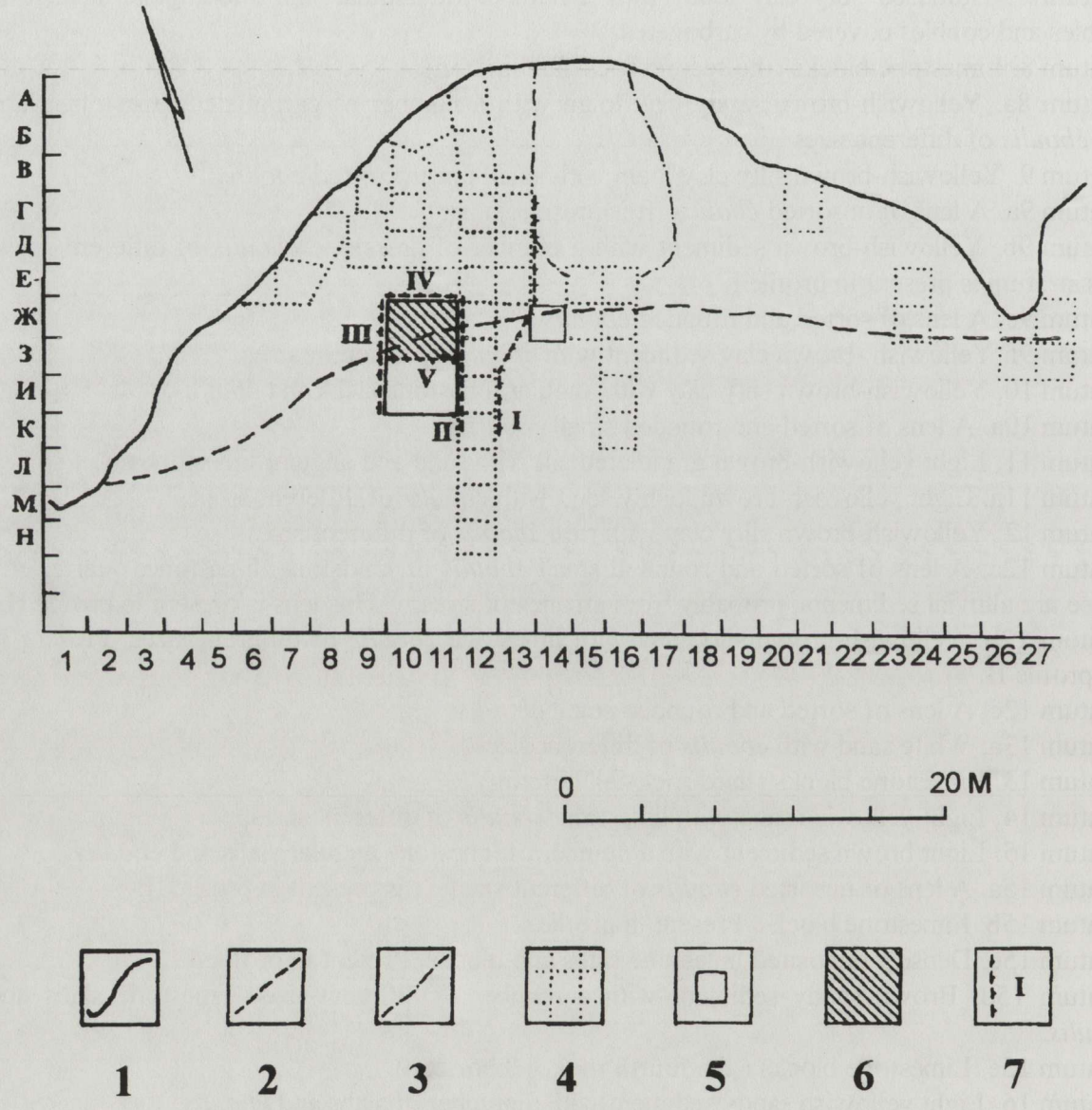

Fig. 1 Siuren-I. Map of the excavations. 1: back wall; 2: drip line; 3: K.S. Merejkowski's excavation area; 4: G.A. Bonch-Osmolowski's excavation area; 5: L.M. Tarasov's excavation area; 6: 1995-96 excavation area; 7: the site's main stratigraphical profiles.

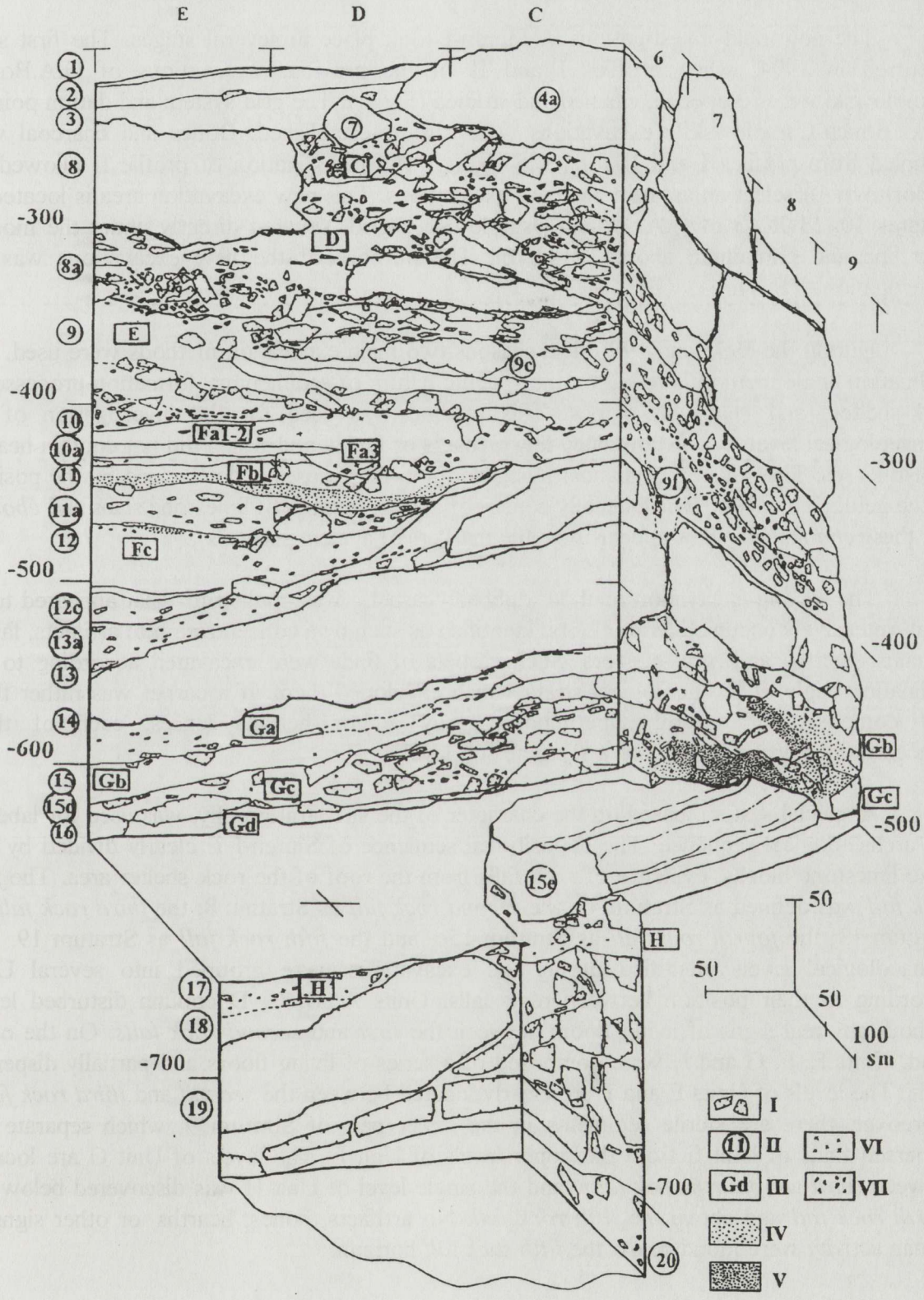

Fig. 2 Siuren-I. Profiles III and IV. I: limestone blocks and slabs; II: number of strata; III: archaeological units and levels; IV: ashy lenses; V: hearths; VI: flint artifacts; VII: charcoal.

STRATEGY AND METHODOLOGY OF THE EXCAVATIONS

The new field investigations at Siuren-I took place in several stages. The first stage occurred in 1994, when profiles I and II of the previous excavations of G.A.Bonch-Osmolowski were re-opened, cleaned and studied (Fig. 1). The grid system and datum point of G.A. Bonch-Osmolowski's excavations were also re-established. Bones and charcoal were sampled from profiles I and II for AMS dating. The investigation of profile II allowed the opportunity to select an area for the new excavations. This new excavation area is located on squares 10, 11-Ж, 3 of G.A. Bonch-Osmolowski's grid, situated directly under the modern drip line and containing about 12 sq. m. The purpose of the new excavations was the investigation of this area.

During the 1995 and 1996 field seasons two main excavation methods were used. The inclination angle method is based on the specific nature of sedimentary formation processes in rock-shelters and near cliff slopes. This method was used for the investigation of the archaeological levels which contained few artifacts or fauna, and which did not contain hearths or ash lenses. The position of ancient living floors in these cases is determined by the position of the geological layers, which usually consist of a great number of limestone slabs and *éboulis*. So, these *éboulis* and slabs appear to be the markers of ancient surfaces.

The second excavation method, dubbed "carpet," was applied to what appeared to be clear, intensively occupied living floors, identified as such by a concentration of artifacts, faunal remains, hearths and ashy clusters. Such carpets of finds were excavated according to the inclination angle of the geological strata which enveloped them. If a carpet was rather thick and composed of several superimposed ashy and/or hearths lenses, each of these concentrations was excavated as a separate sub-level.

A special system, based on the character of the site stratigraphy, was used for labeling the archaeological sequence. The depositional sequence of Siuren-I is clearly divided by five huge limestone blocks, evidence of rock falls from the roof of the rock-shelter area. The *first rock fall* was defined as Stratum 4a; the *second rock fall* as Stratum 8; the *third rock fall*, as Stratum 13; the *fourth rock fall* as Stratum 15e; and the *fifth rock fall* as Stratum 19. The archaeological levels identified during the excavations were grouped into several Units according to their position between rock falls. Units A, B, C, D contain disturbed levels without any real signs of living floors between the *first* and *second rock falls*. On the other hand, Units E, F, G and H were composed of a series of living floors and partially dispersed finds. The levels of Units E and F are clearly located between the *second* and *third rock falls*. Moreover, there are sterile sediments in the lower part of Stratum 9, which separate the dispersed finds of Unit E from the upper levels of Unit F. The levels of Unit G are located between *third* and *fourth rock falls,* and the single level of Unit H was discovered below the *fourth rock fall* and above the *fifth rock fall*. No artifacts, bones, hearths, or other signs of human activity were found below the *fifth rock fall* horizon.

The subdivision of the archaeological sequence of Siuren-I by rock falls was used during G.A. Bonch-Osmolowski's investigations and was published by E.A. Vekilova. Thus, our new stratigraphic classification enables us to correlate our new units with G.A. Bonch-

Osmolowski's *"cultural layers"*. Units A-D and probably Unit E, therefore, correspond to G.A. Bonch-Osmolowski's *Upper cultural layer*, Unit F corresponds to his *Middle cultural layer* and Unit G is the analog of the *Lower cultural layer*. Unit H was not discovered by G.A. Bonch-Osmolowski, as he finished his main excavations above this level. In addition, the separate mapping and labeling of each level from each Unit during the new investigation enabled a more detailed analysis of the artifacts found.

Each of the levels and sub-levels studied were mapped on a scale of 1:10. Conventional signs for categories of finds (bones, teeth, charcoal, etc.) and artifact typology were used in mapping. In addition, no less than 10 elevation measurements were taken for each excavated square.

All excavated sediments were sieved through 5 mm and 1 mm screens. Subsequently, about one-half of most sediments were flotated to obtain microfauna and malacofauna samples. The remainder of the excavated sediments were stored for future flotation.

ARCHAEOLOGICAL SEQUENCE

A total of eight archaeological Units were studied here - Unit A through Unit H.

Unit A was defined in Stratum 4 on an area of about 3.5 sq. m. This Unit was subdivided into four levels. Each of them has an average thickness of about 10 cm. Faunal remains were not found. The majority of artifacts, as well as limestone *éboulis*, were mostly found in vertical position. Some lithics were found in rodent burrows, as well. Obviously, both Unit A and Stratum 4 are in a disturbed stratigraphic context.

Unit B is located in Stratum 6 directly above the rock fall of Stratum 8 and only contained some dispersed charcoal. Unfortunately, during excavations neither lithic artifacts nor animal bones were discovered. The thickness of Unit B is about 3 cm.

Unit C is represented by a single find in the humused sediment of Stratum 7.

Unit D was recognized in the upper part of Stratum 8a. Rare lithic artifacts were dispersed throughout the Unit, which also filled the cracks of the rock-fall of Stratum 8 (the second rock fall horizon).

Unit E was studied directly below rock-fall 8. A few flint artifacts were excavated from the upper part of Stratum 9. Also, a few unidentifiable bone fragments were found.

Unit F was subdivided into several archaeological levels: Fa1-Fa2, Fa3, Fb1-Fb2, and Fc. The majority of these levels is represented by carpets of artifacts, faunal remains and concentrations of charcoal and ash, deposited along the inclination angle of the strata which surrounded them.

Level Fa1-Fa2 was defined in the upper part of Stratum 10. It contained rare flint artifacts and bones, usually deposited on different elevations and frequently vertically oriented. Sub-levels Fa1 and Fa2 were defined according to the elevations of the finds and the inclination angle of the sediments. Neither clusters of artifacts and bones nor hearths were found. The thickness of each sub-level is about 10 cm. The artifacts and bones of level Fa1-Fa2 were spread on the eastern part of excavated area, while the western part was covered by a lens of small rounded *éboulis* (Stratum 10a).

Level Fa3 is located directly below the above-mentioned lens of Stratum 10a in the sediment of Stratum 10. This level is represented by a carpet of finds which covered the entire excavated area. A hearth and two ashy clusters were also found in this level, the thickness of which is 5-10 cm.

Level Fb1-Fb2 is associated with the middle/lower parts of Stratum 11. The difference between sub-levels Fb1 (upper) and Fb2 (lower) is in the color of the sediments. Sub-level Fb2 has a more grayish color, due to the high amount of charcoal and burnt bones. However, several refits of artifacts from these sub-levels indicate the homogeneous nature of level Fb1-Fb2. This level was present over the entire excavation area. On an area of about 12 sq. m. five hearths and four clusters of ash were studied. Four small pits were found below one of the hearths. One of these pits contained a core. The average thickness of this level is about 5-10 cm.

Level Fc was recovered in the upper part of Stratum 12. According to spatial analysis this level contained two clusters of artifacts, faunal remains, charcoal and ash. These clusters are not connected in plane view. The first cluster was in the north-eastern part of the excavated area and contained a hearth which covered less than one square meter. The second cluster was situated in the south-western part of the excavated area and was represented by an ashy lens which covered about 2 squares. The thickness of this level is no more than 3 cm.

Unit G. A total of four levels belong to this Unit.

Level Ga was defined in Stratum 14, directly below the limestone block (Stratum 13). It is highly likely that Stratum 14 originated from the dissolution of the limestone blocks mentioned earlier. If this is so, the finds within Stratum 14 are not a separate archaeological level, but rather the top of level Gb which is directly below. Ashy lenses, clusters of charcoal and/or fire places were not found in level Ga. The average thickness of this level is 5-10 cm.

Level Gb1-Gb2 was traced in Stratum 15. Level Gb is represented by two sub-levels: Gb1 (upper part of the level) and Gb2. Both of them consist of hearth and ashy lenses. In the northern-western and central parts of the excavation area in about 3 squares these sub-levels were separated by limestone slabs. There was no lithological marker on the rest of the excavation area suitable for the subdivision of level Gb. Moreover, several hearth lenses were superimposed. Therefore, sub-levels Gb1 and Gb2 could be separate living floors which accumulated without a clear sterile horizon between them. The cultural level covered the entire excavated area. The thickness of level Gb1 is 10-15 cm, while Gb2 is about 10 cm.

Level Gc1-Gc2 is located within stratum 15d. During the excavations, level Gc was subdivided into three sub-levels: Gc1 (the upper part of level), Gc2 and Gc2a (the lower part of level). Sub-level Gc1 covered the entire excavation area. In the north-western part of the excavation area this sub-level is associated with a hearth. It was found directly on a limestone block (Stratum 15e). Sub-level Gc2 is represented by an ashy lens spread on a limited area (about 2 sq.). Sub-level Gc2a was opened in the south-western part of the excavated area, directly below sub-level Gc1.

Level Gd is associated with the contact between Strata 15 and 16. About 8 square meters of level Gd were excavated. The average thickness of this level is about 5-7 cm.

Unit H is associated with the sediments of Stratum 17 and is represented by just a single archaeological level. The average thickness of this level is no more than 10 cm. Unit H was excavated on the 4 m. sq. area of the sondage. A single hearth was identified in the southwestern part of the sondage. This Unit was not represented in the previous excavations of Siuren-I by G.A. Bonch-Osmolowski.

DATES

Six samples for AMS datation (three charcoal and three bone) were obtained during the cleaning of profiles I and II in the 1994 field season. Bone sample 1 from level Fb2 (profile II) was not dated because of its unusual δ13C, which indicates either some sort of contamination, or degradation of the collagen. Charcoal sample 2 was also unreliable for AMS analysis. Charcoal samples 1 and 3 were dated. It is quite obvious that the samples were contaminated, because the dates obtained (Table 1) are too young. This could be explained by the presence of modern plant roots. Two dates were obtained from the bone samples for levels Fb1 and Ga. These dates do not correspond with the stratigraphic position of the archaeological levels. However, the differences between them are not very large. Therefore, these dates represent a starting point for further, hopefully more precise, datations.

Charcoal sample 1	profile II, level Fb2	10520 ± 150 BP (Lv-2131)
Charcoal sample 2	profile I, level Fb1	not dated
Charcoal sample 3	profile I, Unit G	250 ± 60 BP (Lv-2132)
Bone sample 1	profile II, level Fb2	low collagen
Bone sample 2	profile II, level Ga	28450 ± 600 BP (OxA-5154)
Bone sample 3	profile I, level Fb2	29950 ± 700 BP (OxA-5155)

Table 1. AMS dates.

SOME NOTES ON ARTIFACT CLASSIFICATION

Before presenting our detailed artifact description from all archaeological assemblages recovered from Siuren-I, we would like to present rather briefly our basic techno-typological approach.

Basically, traditional typological definitions are used (e.g. Sonneville-Bordes and Perrot, 1954-1956; Hours, 1974). However, some specifications are needed for several tool categories and types. This is because we are dealing with Aurignacian of Krems-Dufour industries, and problems with definitions of some so-called Aurignacian types always arise.

First of all, we were concerned with the morphological differences between *bladelet cores*, *carinated endscrapers* and *carinated burins*, although the latter type is poorly represented in our collections. On the basis of previously published discussions on this subject (e.g. Movius and Brooks 1971; and especially Bergman 1987: 7-13) and our own thorough observations of similar pieces from this site, we have elaborated and used the following definitions in addition to the traditional ones.

A *carinated endscraper* should always have a front-edge scraper width greater than the length of lamellar retouch facets which created this front edge.

A *bladelet core,* on the other hand, should always have bladelet removal scars longer than the width of the core platform from which the bladelet removals were struck. The only allowable exception when the length of bladelet removal scars from a bladelet core are shorter than the platform width, is when the edges of the platform are clearly quite irregular and rough in a way that is not consistent with endscraper morphology. In addition, we have defined a *bladelet carinated core type*. This is not really a new type, as several archaeologists have already used this term for some cores in Aurignacian industrial contexts, including E. Sachse-Kozlowska (1978), who used this term most convincingly and successfully for Polish Aurignacian assemblages. Our primary aim in the introduction of this bladelet carinated core type is to place under it those pieces which are often classified as different Aurignacian type endscrapers (carinated, nucleiform / core-shaped, and rabot), as well as to enable us to highlight the sum of carinated pieces in each assemblage. Carinated cores are morphologically distinguished from "regular" cores by the following attributes: 1) the bladelet removal scars from "regular" cores are at least twice as long as the width of the core platform, 2) the flaking surface of "regular" bladelet cores is more or less flat; 3) carinated bladelet cores tend to have convex or twisted flaking surfaces, and 4) carinated bladelet cores also tend to be characterized by a sub-cylindrical or pyramidal shape.

Carinated burins are differentiated from carinated endscrapers by the width of their working edge, which should be less than 1 cm, as was proposed by F. Hours (Bergman 1987:12). This does not, however, relate to some very specific narrow-nosed endscrapers (not represented at Siuren-I at all), well defined, for example, by M. Oliva in some Aurignacian Moravian industries (Oliva 1987:78 and Fig.40, 7-10, 16-17 on p.82 and Oliva 1993: Fig.4, 13-15 on p.42 and p.49). On the other hand, differences between carinated burins and bladelet cores again consist of a narrow working edge (less than 1 cm), and infrequent, well-developed bladelet removal negatives on their surfaces for burins.

Both carinated endscrapers and burins are separated from other endscrapers and burins by the term *carinated tools* in order to facilitate the evaluation of their role in each tool collection and to separate them from genuine endscrapers and burins.

In defining various *grattoirs à museau* we have made a distinction between nosed and shouldered flat/thick endscrapers (e.g., Movius and Brooks 1971; Marks and Ferring 1976; Bergman 1987).

As has often been suggested (e.g., Sonneville-Bordes and Perrot 1954; Movius and Brooks 1971), technologically thick nosed/shouldered endscrapers are similar to carinated endscrapers due to lamellar retouch and thick blanks. Accepting this suggestion and in order to better understand pieces with lamellar removals in the Siuren-I industries, we have used the term *carinated pieces* and combined under it several tool and core types (thick nosed/shouldered endscrapers, carinated endscrapers, carinated burins, and bladelet carinated cores) in order to show both their place and the internal differences of this general category in each of Siuren-I's assemblage.

Burins are classified according to traditional types (angle, dihedral, truncation and transverse) without subsequent specifications on their symmetry, truncation shapes, blank types, etc. Such a general classification was used just for this publication in order to represent the general structure of burin types.

Middle Paleolithic tool types (points, sidescrapers and bifacial pieces) are classified for this publication in the traditional, mainly Bordean, manner but without detailed subdivisions on shapes. This detailed method of classification has already been applied to Crimean Middle Paleolithic assemblages (Chabai and Demidenko 1998).

Retouched pieces are defined by the presence of marginal (mainly discontinuous) and/or irregular retouch. They are subdivided only by blank type - blades and flakes.

Among other tool types, only non-geometric microliths deserve some comments. Like the unretouched pieces (see below for definitions), retouched bladelets were subdivided into bladelets (*sensu stricto*) and microblades. Then, they were subdivided according to retouch type: 1) fine and/or semi-steep retouch, and 2) abrupt retouch, although the latter is rare and was noted only on a few microblades. The further classification of bladelets and microblades with fine and/or semi-steep retouch is done according to location of retouch. Therefore, pieces with inverse and alternate retouch were traditionally defined as lamelles Dufour. Pieces with obverse and bilateral obverse retouch were called lamelles "pseudo-Dufour" (Kozlowski 1965:37) because their only difference with genuine lamelles Dufour is the location of retouch. One more Aurignacian type among these pieces is the Krems point, which is present on both microblades and bladelets. Pieces with obverse retouch at the distal end, micronotches and microdenticulate edges are included in the non-geometric microliths on the basis of both blank type (bladelets/microblades) and retouch type (fine and/or semi-steep) and, therefore, are not considered to be related to regular truncated pieces, notches and denticulates.

Aside from these typological specifications and definitions, we have also been concerned with some technological peculiarities among the Siuren-I assemblages which raise the possibility of nonhomogenous technological characteristics of these Aurignacian of Krems-Dufour type industries. In order to investigate this possibility, we added two technological features/ attributes to the artifact analysis: 1) the subdivision of bladelets into microblades and

bladelets (*sensu stricto*), and 2) profile types (flat, incurvate and twisted), for bladelets and microblades. The latter attribute, along with some other attributes, was in fact very successfully used in the Near East to separate Aurignacian and non-Aurignacian (Ahmarian) industries (Marks 1981; Ferring 1988) as well as to subdivide different types of Aurignacian industries (Bergman 1987).

Bladelets are blades with a maximum width of less than 12 mm. (Tixier 1974:5-8) and a minimum width equal to or more than 7 mm, with no limitations on their length.

Microblades are bladelets with a maximum width of less than 7 mm.

In conjunction with the characteristics of cores and carinated pieces, the subdivision of bladelets into microblades and bladelets (*sensu stricto*) and the data on their profile types should provide enough information for the analysis of possible technological differences between the assemblages of Siuren-I within the framework of this publication.

Three more lithic categories need to be mentioned here.

Core preparation and repreparation pieces (crested debitage and core tablets) are grouped together into one debitage category in order to show their value in each assemblage and as indicators of on-site primary flaking processes. We have used the following shortened term for them: core re/preparation pieces.

Chips include both complete pieces and any tiny unidentifiable fragments with a maximum dimension of less than 15 mm.

Chunks are composed of both unidentifiable flint pieces and heavily burnt artifacts. For the present publication no distinction is made between these two categories of chunks.

DESCRIPTION OF THE ARTIFACTS

Unit A: Flint Artifacts

The assemblage is composed of finds from sub-levels Aa, Ab1, Ab2 and Ab3. Taking into account both the stratigraphic context and the paucity of artifacts, all lithics were grouped together for description. Thus, the assemblage of Unit A contains 82 items. These are: 2 cores, 14 flakes, 7 blades, 11 bladelets, 7 microblades, one core re/preparation piece, 8 tools, 29 chips and 3 chunks.

Core-like pieces. These consist of one blade/let opposed-platform core with adjacent flaking surfaces, and one blade single-platform narrow flaked core.

Tools. Tools were subdivided into 3 burins, one straight-backed microblade (its distal

end), one straight-backed bladelet (its proximal part), one perforator, and two retouched pieces (one on a blade and one on a flake). Two of the burins are on truncations, and one is a double dihedral piece. All burins were made on blades, including one crested piece.

Flakes. These are represented by 14 unretouched pieces and one retouched item. Five flakes are partially cortical.

Blades. The blade assemblage is composed of 7 unretouched pieces, one retouched item and 3 tools (burins) and one perforator. Three artifacts are partially cortical.

Bladelets. They are represented by 11 unretouched pieces and one backed piece. Two of them are partially cortical.

Microblades. There are 7 unretouched pieces and one backed piece.

Core re/preparation pieces. This category is represented by one crested blade (double dihedral burin) and an unretouched crested flake.

Unit C: Flint Artifacts

There is only a single piece in Unit C -- a double carinated burin.

Unit D: Flint Artifacts

There are 8 flint artifacts in Unit D: 2 cores, 5 flakes, one bladelet.

Core-like pieces. Both of these are opposed-platform cores. They differ, however, in that one of them has a sub-cylindrical shape and is intended for bladelet production, while the other one has a flat/rectangular shape and is for blade production.

Flakes. Only one of the 5 flakes is partially cortical.

Bladelets. The sole bladelet has a flat profile.

Unit E: Flint Artifacts

This assemblage contains: one core, 3 flakes, one tool, one chip and one chunk.

Core-like pieces. This is a bladelet carinated single-platform pyramidal core.

Tool. It is a carinated burin.

Flakes. They are represented by three fragmented noncortical pieces.

	Fa1 & Fa2		Fa3		Fb1 & Fb2		Fc	
	No	%	No	%	No	%	No	%
flakes	50	32.89	106	26.77	753	11.96	14	25.45
blades	14	9.21	33	8.33	89	1.41	6	10.91
bladelets	23	15.13	36	9.09	272	4.32	8	14.54
microblades	10	6.57	53	13.38	934	14.84	9	16.36
core re/preparation pieces	6	3.94	15	3.78	117	1.86	0	0.00
core-like pieces	1	0.65	3	0.75	20	0.32	0	0.00
tools	6	3.94	7	1.77	153	2.43	1	1.82
burin spalls	1	0.65	4	1.01	41	0.65	0	0.00
chips	41	26.97	129	32.57	3665	58.23	17	30.91
chunks	0	0.00	10	2.52	249	3.95	0	0.00
total	**152**	**100.00**	**396**	**99.97**	**6293**	**99.97**	**55**	**99.99**

Table 2. Siuren-I, Unit F: artifact totals.

Unit F: Flint Artifacts

The total number of flint artifacts recovered from Unit F is 6,896 pieces. The most numerous assemblage is that of level Fb1-Fb2: 6,293 artifacts (Table 2). In general, the flint artifacts can be divided into 10 major categories: flakes, blades, bladelets, microblades, core re/preparation pieces, core-like pieces, tools, burin spalls, chips and chunks. The lithic assemblages of levels Fa1-Fa2, Fa3 and Fc1-Fc2 contain a similar typological configuration, while the assemblage from level Fb1-Fb2 is characterized by a somewhat low percentage of flakes, blades, and bladelets and a fairly high percentage of chips (Table 2).

Level Fa1-Fa2

There are 152 flint artifacts in this level (Table 2). They are categorized as follows: 50 flakes, 14 blades, 23 bladelets, 10 microblades, 6 core re/preparation pieces, one core, 6 tools, one burin spall, and 41 chips.

Core-like pieces. The single core was defined as a multi-platform bladelet core.

Tools. A total of 6 tools were recovered in this level: two endscrapers, one carinated burin on a flake, one burin on truncation on a blade fragment (Fig. 3, 1), one alternately retouched twisted microblade (lamelle Dufour) (Fig. 3, 2) and one retouched piece on a flake (Table 4). One endscraper is a thick, shouldered one on a core tablet of flake proportions (Fig. 3, 6) and the other is a flat, shouldered endscraper on a blade fragment (Fig. 4, 3).

Debitage. All debitage and pieces with secondary treatment are summarized together and presented below according to blank type.

Flakes. They are represented by 50 unretouched items and 3 pieces with secondary treatment. The majority of flakes (29 pieces, or 55%) are not covered by cortex while the rest are partially cortical. The majority of flakes are shorter than 3 cm.

Blades. The blade assemblage contains 14 unretouched, one retouched, one with burin on truncation, 3 crested blades and one core tablet. Only 4 blades are partially cortical, and the rest are non-cortical.

Bladelets. Twenty-three unretouched and one crested bladelet were recovered from this level. None of them is retouched. The distribution of profile types is as follows: flat - 1, incurvate - 8, twisted - 12, unidentifiable - 3.

Microblades. This category of artifacts is represented by 10 unretouched, one alternately retouched and one crested piece. Only 3 of them have incurvate profiles, while the remainder have twisted profiles.

Core re/preparation pieces. All of them are mentioned in the previous categories, except for one, which was used for endscraper manufacture. This category of artifacts thus contains: core tablet on a blade - 1, core tablet on a flake (endscraper) -1, crested blades -3, crested bladelet - 1 and crested microblade - 1.

Level Fa3

A total of 396 flint pieces were recovered from this level (Table 2). This assemblage is composed of: 106 flakes, 33 blades, 36 bladelets, 53 microblades, 15 core re/preparation pieces, 3 core-like pieces, 7 tools, 4 burin spalls, 129 chips and 10 chunks.

Core-like pieces. These are represented by a single pre-core and two cores. The pre-core has two opposite platforms with a narrow flaked surface prepared by a crested ridge. Both cores are single-platform bladelet cores. One of them was identified as carinated, with a sub-cylindrical flaking surface, while the other one is characterized by a narrow flaked surface on a flake.

Tools. They consist of: one simple endscraper on a blade, 2 burins on blades (a double dihedral and a broken one), one twisted bladelet with semi-steep inverse retouch (lamelle Dufour), 2 twisted microblades with fine obverse retouch (lamelle pseudo-Dufour) and a single fragment of an unidentifiable tool (Table 4).

Debitage. All unretouched blanks, as well as pieces with secondary treatment were summarized and are presented below according to blank type.

Flakes. This category of artifacts is represented by 106 unretouched pieces and 4 core tablets. The majority of flakes (74) are noncortical, 33 others are partially cortical, and only 3 pieces are completely cortical. About 90% of flakes are no longer than 3 cm.

Blades. They are subdivided into 33 unretouched, 3 retouched, 4 crested blades and 2 core tablets. Eight blades are partially cortical, and no blades are completely cortical.

Bladelets. A total of 40 bladelets are subdivided into 36 unretouched, 3 crested and one retouched piece. The profile types are as follows: flat - 3; incurvate - 8; twisted - 27; unidentifiable -2.

Microblades. They are represented by 53 unretouched, 2 retouched and 2 crested pieces. There are 38 microblades with twisted profiles, 9 with flat and 9 with incurvate profiles.

One microblade has an unidentifiable profile.

Core re/preparation pieces. This category of artifacts is subdivided into 4 crested blades, 3 crested bladelets, 2 crested microblades, 2 core tablets on blades and 4 core tablets on flakes.

Level Fb1-Fb2

There are 6,293 artifacts in this level (Table 2). The lithic assemblage is composed of 753 flakes, 89 blades, 272 bladelets, 934 microblades, 117 core re/preparation pieces, 20 core-like pieces, 153 tools, 41 burin spalls, 3665 chips and 249 chunks.

Core-like pieces. This category of artifacts is composed of 20 pieces. More than half of them are for bladelet production, and half of the identifiable cores consist of carinated cores for the production of twisted microblades and bladelets. Thus the following typological structure of core-like pieces can be presented:

PRE-CORE	**1**
FLAKE/BLADE CORES	**1**
-single platform	1
BLADE/BLADELET CORES	**3**
-opposed platforms, sub-cylindrical	1
-opposed platforms, adjacent	2
BLADELET CORES	**3**
-single platform, with narrow flaked surface	1
-opposed platforms, sub-cylindrical	1
-opposed platforms, alternate	1
BLADELET CARINATED CORES	**7**
-single platform, pyramidal	2
-single platform, sub-pyramidal	1
-single platform, sub-cylindrical	1
-orthogonal-alternate	1
-opposed platform, narrow flaked surface	2
UNIDENTIFIABLE CORES	**4**

Tools. A total of 153 tools were recovered from level Fb1-Fb2 (Table 4). About half of these are non-geometric microliths. The typological makeup of the tools is as follows: 10 endscrapers, 9 burins, 3 carinated tools, one notch, one denticulate, 2 composites, 49 retouched pieces, 2 unidentifiable and 76 non-geometric microliths.

The endscrapers are subdivided as follows: 3 simple on blades (Fig. 4, 1,2), 2 ogival on flakes (Fig. 3, 5), one thick shouldered on a blade (Fig. 4, 6), one circular and 3 fragments of distal ends. Burins are subdivided into 4 dihedrals (Fig. 3, 3-4; Fig. 4, 5), one double dihedral, 2 on truncations, one angle burin and one transverse on a lateral preparation. Carinated tools are represented by 2 endscrapers and one burin. The composite tools consist of a simple endscraper/dihedral burin (Fig. 4, 4) and a simple endscraper/carinated endscraper. Both notch

and denticulate were made by obverse retouch on the lateral edges of flakes. Of the retouched pieces, 30 are on flakes and 19 on blades.

Non-geometric microliths are subdivided into three main groups: 1) microblades with fine and/or semi-steep marginal retouch - 69 pieces; 2) bladelets with fine and/or semi-steep marginal retouch - 4 pieces; 3) abruptly retouched microblades - 3. The first group is further subdivided into 27 pieces with inverse retouch (lamelle Dufour) (Fig. 5, 10-16, 24, 25); 14 pieces with alternate marginal retouch (lamelle Dufour) (Fig. 5, 17-23); 22 pieces with obverse marginal retouch (lamelle pseudo-Dufour) (Fig. 5, 1-8); 5 pieces with bilateral obverse marginal retouch on both lateral edges (lamelle pseudo-Dufour) (Fig. 5, 9); one piece with an obverse micronotch on one lateral edge. The second group of non-geometric microliths is subdivided into a single piece with obverse retouch on one lateral edge and 3 pieces with obverse retouch on the distal end. Finally, the abruptly retouched microblades are represented by 3 straight backed pieces.

The profiles of 12 non-geometrical microliths are unidentifiable. The rest, except for four incurvate pieces, were determined to be of the twisted type.

Debitage A total of 2,318 items, including all kinds of unretouched blanks and pieces with secondary treatment, were recovered from this level. The summarized characteristics of the debitage types are presented below according to blank type.

Flakes. The total number of flakes is 824. They are subdivided into 753 unretouched, 29 crested, 9 core tablets, 10 tools on flakes and 23 retouched pieces. The majority of flakes are not covered by cortex (545). The number of completely cortical pieces (30) is much less. The rest are partially cortical. The length of the largest flake is about 5 cm. The majority of flakes are no longer than 2.5 cm.

Blades. This category of artifacts is subdivided into 89 unretouched, 18 crested, 7 core tablets, 11 tools on blades and 19 retouched pieces. About 57%of blades are not covered by cortex (76 pieces). Others are partially cortical. The majority of blades have twisted (about 40%) or incurvate (about 30%) profiles. The rest are evenly divided into flat and unidentifiable profiles.

Bladelets. They are composed of 272 unretouched, 4 retouched, 23 crested pieces and one core tablet. The majority of bladelets (62.5%) have twisted profiles. About 21% of bladelets have incurvate profiles. Bladelets with flat and unidentifiable profiles are represented by about 8% each. The maximal length of a complete bladelet (crested piece) is 4.9 cm.

Microblades. A total of 1036 microblades were found in the assemblage of level Fb1-Fb2. Microblades are subdivided into 934 unretouched, 72 retouched and 30 crested pieces. Microblades with twisted profiles (65.8%) prevail over other types of profiles: flat - 6.4%; incurvate - 18.1% and unidentifiable - 9.7%.

Core re/preparation pieces. This category is represented by 29 crested flakes, 18 crested blades, 23 crested bladelets, 30 crested microblades, 9 core tablets on flakes, 7 core

tablets on blades and one core tablet on a bladelet. Thus, all categories of debitage are present in the core re/preparation pieces.

Level Fc

There are 55 artifacts in this level (Table 2), representing six different categories: flakes (14), blades (6), bladelets (8), microblades (9), tools (1) and chips (17).

Tool. The single tool is a non-geometric microlith -- a microblade with semi-steep inverse retouch (lamelle Dufour) (Table 4).

Debitage. Debitage types are described below.

Flakes. The majority of flakes (8) are not covered by cortex, 3 pieces are completely cortical, and another 3 pieces are partially cortical.

Blades. Among 6 blades, just one is partly cortical.

Bladelets. Of the 8 pieces, 4 have incurvate profiles, 2 are twisted and 2 are flat.

Microblades. This category contains 9 unretouched and one retouched piece. The following types of profiles were defined: flat - 1; incurvate - 3; twisted - 6.

Unit G: Flint Artifacts

The total number of artifacts in the assemblages of Unit G is 4,507 pieces. More than half of them came from level Gc1-Gc2 (Table 3). The patterns of the artifact categories in the four assemblages of Unit G are practically identical, aside from the notable absence of core-like pieces and core re/preparation pieces in level Ga.

	Ga		Gb1 & Gb2		Gc1-Gc2		Gd		H	
	No	%	No	%	No	%	No	%	No	%
flakes	44	16.29	172	14.04	424	18.47	155	21.62	39	31.71
blades	15	5.55	64	5.22	177	7.71	62	8.65	15	12.19
bladelets	14	5.19	101	8.24	251	10.94	82	11.44	8	6.50
microblades	10	3.70	79	6.45	98	4.27	39	5.44	2	1.62
core re/preparation pieces	0	0.00	13	1.06	47	2.05	13	1.81	4	3.25
core-like pieces	0	0.00	8	0.65	10	0.44	2	0.28	1	0.81
tools	16	5.93	67	5.47	195	8.49	60	8..36	15	12.19
burin spalls	2	0.74	7	0.57	17	0.74	0	0.00	3	2.44
chips	130	48.15	638	52.08	939	40.92	267	37.24	30	24.39
chunks	39	14.44	76	6.20	137	5.97	37	5.16	6	4.88
TOTAL	**270**	**99.99**	**1225**	**99.98**	**2295**	**100.00**	**717**	**100.00**	**123**	**99.98**

Table 3. Siuren-I, Units G & H: Artifact totals.

Table 4. Siuren-I, Units F, G, and H: Tools.

	Fa1-Fa2	Fa3	Fb1-Fb2	Fc	Ga	Gb1-Gb2	Gc1-Gc2	Gd	H
ENDSCRAPERS	2 /33.33	1 /14.28	10 /6.54	0 /0.00	2 /12.50	2 /2.99	4 /2.05	1 /1.66	1 /6.66
BURINS	0 /0.00	2 /28.57	9 /5.88	0 /0.00	2 /12.50	5 /7.46	5 /2.56	2 /3.33	1 /6.66
TRUNCATIONS	0 /0.00	0 /0.00	0 /0.00	0 /0.00	0 /0.00	0 /0.00	2 /1.03	1 /1.66	1 /6.66
CARINATED TOOLS	1 /16.66	0 /0.00	3 /1.96	0 /0.00	0 /0.00	1 /1.49	0 /0.00	0 /0.00	0 /0.00
NOTCHES	0 /0.00	0 /0.00	1 /0.65	0 /0.00	0 /0.00	2 /2.99	5 /2.56	1 /1.66	2 / 13.33
DENTICULATES	0 /0.00	0 /0.00	1 /0.65	0 /0.00	0 /0.00	1 /1.49	0 /0.00	0 /0.00	0 /0.00
COMPOSITE TOOLS	0 /0.00	0 /0.00	2 /1.31	0 /0.00	0 /0.00	0 /0.00	2 /1.03	0 /0.00	0 /0.00
RETOUCHED BLADES	0 /0.00	0 /0.00	0 /0.00	0 /0.00	0 /0.00	1 /1.49	4 /2.05	2 /3.33	1 / 6.66
MIDDLE PALEOLITHIC TYPES	0 /0.00	0 /0.00	0 /0.00	0 /0.00	0 /0.00	1 /1.49	13 /6.66	1 /1.66	1 / 6.66
RETOUCHED PIECES	1 /16.66	0 /0.00	49 /32.03	0 /0.00	3 /18.75	8 /11..94	40 /20.51	17 /28.33	2 /13.33
UNIDENTIFIABLE	0 /0.00	1 /14.28	2 /1.31	0 /0.00	0 /0.00	3 /4.47	6 /3.07	4 /6.66	1 / 6.66
NON-GEOMETRIC MICROLITHIS	1 /16.66	3 /42.85	76 /49.67	1 /100.00	9 /56.25	4//364.18	114 /58.46	31 /51.66	5 /33.33
" Krems points" on bladelets	0	0	0	0	0	0	2 /1.03	0	0
bladelets with inverse retouch "Dufour"	0	1 /14.28	0	0	0	2 /2.99	2 /1.03	3 /5.00	0
bladelets with alternate retouch "Dufour"	0	0	0	0	2 /12.50	2 /2.99	20 /10.26	3 /5.00	1/6.66
bladelets with alternating retouch	0	0	0	0	0	1 /1.49	0	0	0
bladelets with obverse retouch "pseudo-Dufour"	0	0	1 /0.65	0	1 /6.25	2 /2.99	2 /10.3	1 /1.66	1/6.66
bladelets with bilateral obverse retouch "pseudo-Dufour"	0	0	0	0	0	0	1 /0.51	1 /1.66	0
bladelets with obverse retouch at distal end	0	0	3 /1.96	0	0	1 /1.49	0	0	0
bladelets with micro-notch	0	0	0	0	1 /6.25	0	8 /4.10	0	0
"Krems points" on microblades	0	0	0	0	1 /6.25	0	2 /1.03	0	0
microblades with inverse retouch "Dufour"	0	0	27 /17.65	1 /100	1 /6.25	3 /4.48	5 /2.56	0	0
microblades with alternate retouch "Dufour"	1 /16.66	0	14 /9.15	0	2 /12.50	27 /40.29	62 /31.79	19 /31.66	2 /13.33
microblades with obverse retouch "pseudo-Dufour"	0	2 /28.57	22 /14.37	0	0	4 /5.97	3 /1.54	2 /3.33	1 /6.66
microblades with bilateral obverse retouch "pseudo-Dufour"	0	0	5 /3.27	0	1 /6.25	1 /149	4 /2.05	1 /1.66	0
microblades with micro-notch	0	0	1 /.065	0	0	0	1 /0.51	0	0
microblades with microdenticulate edge	0	0	0	0	0	0	1 /0.51	0	0
abruptly retouched microblades	0	0	3 /1.96	0	0	0	1 /0.51	1 /1.66	0
TOTAL	**6 /100**	**7 /100**	**153 /100**	**1 /100**	**16 /100**	**67 /100**	**195 /100**	**60 /100**	**15 /100**

Level Ga

A total of 270 flint artifacts were recovered from this level (Table 3). They are subdivided into flakes (44), blades (15), bladelets (14), microblades (10), tools (16), burin spalls (2), chips (130) and chunks (39).

Tools. This assemblage is composed of 2 endscrapers; 2 burins; 3 retouched pieces and 9 non-geometric microliths (Table 4). The two endscrapers are of different types: a simple endscraper on a blade (Fig. 6, 11) and a unilateral/flake endscraper (Fig. 6, 9). One burin is dihedral, while the other is a burin on angle. The retouched pieces are composed of two flakes and single blade.

Non-geometric microliths are composed of bladelets (4 pieces) and microblades (5 pieces) with fine and/or semi-steep retouch. Retouched bladelets are subdivided into: two pieces with alternate retouch (lamelle Dufour), one piece with obverse retouch (lamelle pseudo-Dufour) and one piece with a lateral dorsal micronotch.

Retouched microblades are represented by one pointed piece with bilateral converging fine retouch (Krems point) (Fig. 6, 5), one piece with inverse retouch (lamelle Dufour), 2 pieces with alternate retouch (lamelle Dufour) and one piece with bilateral obverse retouch (lamelle pseudo-Dufour).

Debitage. Both unretouched pieces and blanks with secondary treatment are listed below according to blank type.

Flakes. This category of artifacts is represented by 44 unretouched, 2 retouched pieces and one tool on a flake. Four flakes are completely covered by cortex, 23 are noncortical and the remainder (20 pieces) are partially cortical. The majority of flakes are no longer than 3 cm.

Blades. They are subdivided into: 15 unretouched pieces, one blade with discontinuous retouch and 3 tools on blades. The majority of blades (14 pieces) are noncortical, while 5 are partially cortical. Flat and incurvate profiles prevail among pieces with identifiable profiles. Only two blades have twisted profiles.

Bladelets. These are represented by 14 unretouched and 4 retouched pieces. The distribution of profile types is as follows: flat - 5; incurvate - 3; twisted - 4; unidentifiable - 6.

Microblades. These consist of 10 unretouched and 5 retouched ones. Only one microblade has a twisted profile. The majority of them (7) are characterized by an incurvate profile. Two more pieces have flat profiles, and the rest are unidentifiable in profile.

Level Gb1-Gb2

The lithic assemblage of this level consists of 1225 pieces (Table 3). They are subdivided into flakes (172), blades (64), bladelets (101), microblades (79), core re/preparation pieces (13), core-like pieces (8), tools (67), burin spalls (7), chips (638) and chunks (76).

Core-like pieces. There are 2 pre-cores, 3 cores and 3 core fragments here. The cores consist of one multiplatform core for flakes and blades (exhausted), and two single platform sub-cylindrical pieces: one for blades (Fig. 6, 14) and the other for bladelets (Fig. 6, 13).

Tools. A total of 67 tools were recovered from level Gb1-Gb2 (Table 4). This category of artifacts contains one thick shouldered endscraper (Fig. 6, 10) one ogival endscraper, 5 burins, one atypical carinated endscraper (Fig. 6, 12), 2 lateral notches, one denticulate, one bilaterally obversely retouched blade, one Middle Paleolithic scraper, 8 retouched pieces, 3 unidentifiable pieces and 43 non-geometric microliths.

The burins are subdivided into the following types: dihedral, double angle (Fig. 6, 8), burin on truncation, burin on a lateral retouch (Fig. 6, 6) and a transverse burin on a natural surface (Fig. 6, 7). The Middle Paleolithic types is longitudinally fragmented obversely retouched canted scraper. Retouched pieces occur on flakes (4 pieces) and on blades (4 pieces).

Non-geometric microliths are subdivided into 8 bladelets and 35 microblades. Bladelets with fine and/or semi-steep retouch are represented by one piece with inverse retouch (lamelle Dufour); one piece with bilateral inverse retouch; one piece with alternate retouch (lamelle Dufour); one piece with alternate retouch and obverse retouch at the distal end (lamelle Dufour); one piece with alternating retouch; 2 pieces with obverse retouch (lamelle pseudo-Dufour) and one piece with obverse retouch at the distal end. Microblades with fine and/or semi-steep retouch are subdivided as follows: 3 pieces with inverse retouch (lamelle Dufour); 27 pieces with alternate retouch (lamelle Dufour) (Fig. 6, 1-4); 4 pieces with obverse retouch (lamelle pseudo-Dufour); and one piece with bilateral obverse retouch (lamelle pseudo-Dufour).

Debitage. Both unretouched pieces and blanks with secondary treatment are presented by the following types of debitage.

Flakes. This category of artifacts contains: 172 unretouched flakes, 6 core tablets and 12 flakes with secondary treatment. The majority of flakes are without cortex (122 pieces), 57 flakes are partially cortical, and 11 flakes are completely cortical. As a rule, flakes are no longer than 3 cm.

Blades. These consist of 64 unretouched blades, 7 crested blades and 11 tools on blades. Most blades (63) are noncortical, and 19 are partially cortical. Among the identifiable profiles, incurvated pieces (27) prevail. Blades with twisted (11) and flat (7) profiles are not numerous. Other blades are too fragmented to be identifiable according to profile type.

Bladelets. This category of artifacts contains 101 unretouched and 8 retouched pieces. Incurvate profiles again dominate (40 pieces), while flat (17) and twisted (15) profiles are present in approximately equal proportions.

Microblades. A total of 114 microblades were recovered form this level. Seventy-nine of these are unretouched, while 35 are retouched. Most identifiable profiles are incurvate type

(36 pieces), followed by flat (26 pieces) and twisted (17 pieces) profiles types.

Core re/preparation pieces. As was mentioned above, this class contains 6 core tablets on flakes and 7 crested blades.

Level Gc1-Gc2

There are 2295 pieces in the lithic assemblage from this level (Table 3). They consist of the following artifact categories: flakes (424), blades (177), bladelets (251), microblades (98), core re/preparation pieces (47), core-like pieces (10), tools (195), burin spalls (17), chips (939) and chunks (137).

Core-like pieces. A total of 10 cores were recovered from this level. Five of them are flake/blade cores: one is a single platform sub-pyramidal type and four are multiplatform types. The last type consists only of exhausted pieces. One core for blade production has been identified as a narrow single-platform core. Bladelet cores (4 pieces) are all carinated and are subdivided as follows: one single platform sub-pyramidal; one double platform perpendicular (Fig. 8, 5) and; 2 double platform orthogonal (Fig. 7, 10,13). We suggest that this last type be called the Siuren type of bladelet carinated cores.

Tools. The total number of tools is 195, and is composed of: 4 endscrapers; 5 burins; 2 truncations; 5 notches, 2 composites, 4 retouched blades, 13 Middle Paleolithic tools, 40 retouched pieces, 6 unidentifiable and 114 non-geometrical microliths.

Endscrapers consist of 3 simple and one double specimen. Two of the simple endscrapers are on partially obversely retouched unilateral blades (Fig. 7, 12) and one more is on a partially obversely retouched bilateral blade. The double endscraper is made on a unilateral/obverse retouched flake.

Two types of *burins* were defined: angle (2 pieces) (Fig. 7, 11)and double angle burin (1) (Fig. 8, 7), in addition to two broken burins. Two cases of oblique *truncations* were found, one each on a flake and on a blade. *Notches* consist of three types: lateral dorsal (2 pieces), lateral ventral (2 pieces), and distal dorsal (1). The *composite tools* are an endscraper/burin and a perforator/angle burin. In the former case it is impossible to identify the type of burin due to the fragmentation of this tool part. The *retouched blades* consist of: Aurignacian-like piece with bilateral scalar and semi-steep retouch (1) (Fig. 7, 14), unilateral retouched piece (1) and bilateral retouched pieces (2). In all cases only obverse retouch was used.

The *Middle Paleolithic tools* of level Gc1-Gc2 are represented by 13 pieces. According to the retouch treatment, they are subdivided into 10 unifacial and 3 bifacial pieces.

The unifacial tools consist of 3 points and 7 scrapers. One of the points is defined as sub-leaf while the other 2 are distal fragments. The sub-leaf point is made on a transversal flake and is intensively retouched all around its perimeter by the combination of obverse scalar and sub-parallel invasive retouches. The ventral surface of this point shows evidence of proximal and distal thinning, as well (Fig. 7, 16). Both fragmented points are characterized by a

combination of obverse scalar and sub-parallel retouch.

The scrapers consist of 4 canted pieces, 2 fragmented pieces and one unidentifiable item. All of them are made on flakes. One of the canted scrapers is ventral, while the other 3 are dorsal. The canted ventral scraper is elaborated by inverse scalar retouch, while all canted dorsal scrapers are characterized by obverse scalar semi-steep invasive retouch (Fig. 8, 6), one of them showing in addition basal thinning. Two fragmented pieces can be cautiously classified as simple and double scrapers, although, taking into account their fragmented nature, it is equally possible that they were actually treated as points and/or convergent scrapers and then broken. The fragmented double scraper also has a thinned base. The single unidentifiable scraper is thus classified due to its heavily burnt nature.

The bifacial tools consist of one semi-leaf/triangular point made in the bi-convex manner and with a notched base (Fig. 7, 17); a single-edged scraper made on an exhausted core or on a piece which was heavily treated in the plano-convex manner; and the medial part of a foliate piece made in the plano-convex manner.

Retouched pieces are subdivided into 13 flakes and 27 blades.

Non-geometric microliths are the main tool class in the assemblage of this level, as well as the major type of artifact at Siuren-I. They are subdivided into three main groups: bladelets with fine and/or semi-steep marginal retouch (35 pieces), microblades with fine and/or semi-steep marginal retouch (78 pieces) and one abruptly retouched microblade.

Bladelets with fine and/or semi-steep retouch are further subdivided into one pointed piece with bilateral obverse converging retouch (Krems point); one pointed piece with bilateral alternate converging retouch (Krems point variant) (Fig. 7, 5); 2 pieces with inverse retouch (lamelle Dufour); 20 pieces with alternate retouch (lamelle Dufour) (Fig. 7, 6, 15; 8, 2, 4); 2 pieces with obverse retouch (lamelle pseudo-Dufour); one piece with bilateral obverse retouch (lamelle pseudo-Dufour); 5 pieces with lateral/dorsal micro-notches; and 3 pieces with distal\dorsal micro-notches. Microblades with fine and/or semi-steep retouch are represented by 2 pointed pieces with bilateral obverse converging retouch (Krems points) (Fig. 8, 1); 5 pieces with inverse retouch (lamelle Dufour); 62 pieces with alternate retouch (lamelle Dufour) (Fig. 7, 1-4, 7-9; 8, 3); 3 pieces with obverse retouch (lamelle pseudo-Dufour); 4 pieces with bilateral obverse retouch (lamelle pseudo-Dufour); one piece with lateral alternate micronotches; and one piece with an obverse microdenticulate edge. Also, a single bilaterally backed microblade was identified.

Debitage. The total number of unretouched pieces and blanks with secondary treatment is 1,192 items.

Flakes. This level yielded a total of 452 flakes. Of these, 424 are unretouched, 19 are tools on flakes, 5 are core tablets on flakes and 4 are crested flakes. Noncortical pieces dominate: 296 pieces or 65.5%. Only 22 (4.8%) flakes are completely cortical. The rest are partially cortical. The majority of flakes do not exceed 3 cm in length.

Blades. The blade assemblage consists of 177 unretouched pieces, 24 crested pieces and 41 pieces with secondary treatment. About half of the blades have incurvate profiles. The frequency of twisted and flat profiles is about 20% each. The majority of blades (159 pieces or about 66%) are noncortical. Completely cortical blades are absent.

Bladelets. A total of 296 pieces were recovered from this level. Thirty-five of them are retouched and 10 more are crested. Both incurvate (100 pieces) and twisted (112 pieces) profiles occur at about the same frequency: 33.7% and 37.8%, respectively.

Microblades. The microblade assemblage consists of 98 unretouched, 79 retouched and 4 crested pieces. Therefore, about 44% of the total number of microblades were elaborated by retouch! This is the highest percentage of retouched pieces among all kinds of debitage in all the Siuren-I levels. The distribution of profile types is as follows: flat - 32 pieces; incurvate - 72 pieces; twisted - 55 pieces, and unidentifiable - 22 pieces.

Core re/preparation pieces. This class of artifacts contains: 5 core tablets on flakes, 4 crested flakes, 24 crested blades, 10 crested bladelets, 4 crested microblades. All kinds of debitage, therefore, are present in this category.

Level Gd

A total of 717 artifacts were excavated from this level (Table 3). They are subdivided into the following categories: flakes (155), blades (62), bladelets (82), microblades (39), core re/preparation pieces (13), core-like pieces (2), tools (60), chips (267) and chunks (37).

Core-like pieces. Both of these are bladelet cores: one is a single-platform carinated sub-cylindrical core (Fig. 9, 7), while the other is a double-platform opposed alternate core with two narrow flaked surfaces (Fig. 9, 9).

Tools. They are represented by one endscraper on a flake with bilateral obverse retouch (Fig. 9, 8), 2 burins, one concave truncation on a blade, one lateral/dorsal notch on a blade, 2 bilaterally obversely retouched blades, one Middle Paleolithic tool, 17 retouched pieces, 4 unidentifiable and 31 non-geometrical microliths.

One *burin* is a double burin: on angle and on truncation. The other burin is broken.

The Middle Paleolithic artifact is identified as a unifacial point with basal thinning (Fig. 9, 5). This point was made on a transversal flake and elaborated by obverse scalar and stepped semi-steep retouch.

Retouched pieces are made on both flakes (4 pieces) and blades (13 pieces).

There are three groups of *non-geometric microliths*: bladelets with fine and/or semi-steep marginal retouch (8 pieces); microblades with fine and/or semi-steep marginal retouch (22 pieces), and one abruptly retouched microblade. The retouched bladelets are subdivided into 3 pieces with inverse retouch (lamelle Dufour); 3 pieces with alternate retouch (lamelle

Dufour) (Fig. 9, 1, 2, 6); one piece with partial obverse retouch (lamelle pseudo-Dufour); and one piece with bilateral obverse retouch (lamelle pseudo-Dufour). The retouched microblades consist of 19 pieces with alternate retouch (lamelle Dufour) (Fig. 9, 3); 2 pieces with obverse retouch (lamelle pseudo-Dufour); and one piece with bilateral obverse retouch (lamelle pseudo-Dufour). One more retouched microblade is identified as a bilaterally backed piece (Fig. 9, 4).

Debitage. All debitage and pieces with secondary treatment are presented below according to blank type.

Flakes. These consist of 155 unretouched pieces, 3 core tablets and 2 flakes modified by retouch. The majority of flakes (102 pieces) are noncortical; nine flakes are completely cortical and the rest are partially cortical.

Blades. A total of 75 blades were recovered from this level. The blade assemblage consists of 62 unretouched pieces, 7 crested blades, and 6 tools on blades. The majority of blades are non-cortical (53 pieces), while the rest are partially cortical. Both twisted (28 pieces) and incurvate (25 pieces) types of profile are present in approximately equal numbers. Only 11 blades have flat profiles and the rest are unidentifiable.

Bladelets. This category of artifacts is composed of 82 unretouched pieces, one crested bladelet and 8 pieces modified by retouch. The distribution of profile types is as follows: flat - 4; incurvate - 41; twisted - 30; unidentifiable - 16.

Microblades. This category contains 39 unretouched pieces; 2 crested pieces and 23 pieces modified by retouch. Microblades with incurvate (18) and twisted (26) profiles prevail. The rest (flat profiles - 9 pieces, and unidentifiable profiles- 11 pieces) are not as numerous.

Core re/preparation pieces. A total of 13 pieces were recovered. All categories of debitage are present: 7 crested blades, one crested bladelet, 2 crested microblades and 3 core tablets.

Unit H: Artifacts

Only 123 artifacts were recovered from Unit H (Table 3). However, the excavation of this Unit is not yet finished. During the 1996 field season about half of the available area was excavated. While taking into account the smaller size of the excavated area, it is important to note the small density of artifacts in this Unit, as well as the fact that it is represented by just a single occupational level.

The lithic composition of Unit H is: flakes (39), blades (15), bladelets (8), microblades (2), core re/preparation pieces (4), core-like pieces (1), tools (15), burin spalls (3), chips (30) and chunks (6).

Core-like pieces. The sole core has been identified as a blade/bladelet multiplatform core.

Tools. The following types of tools were defined: one thick-nosed endscraper, one double transverse burin, one blade with double straight (alternate) truncation, 2 notches on blades (lateral ventral and bilateral dorsal), one lateral obverse retouched blade, one Middle Paleolithic tool (the tip of a unifacial point), 2 retouched pieces on blades, one unidentifiable fragment and 5 non-geometric microliths (Table 4). The non-geometric microliths consist of 2 bladelets and 3 microbladelets with fine and/or semi-steep retouch. The retouched bladelets are subdivided into one piece with alternate retouch (lamelle Dufour) and one piece with obverse retouch (lamelle pseudo-Dufour). Two types of retouched microblades were also distinguished - two pieces with alternate retouch (lamelle Dufour) and a single piece with obverse retouch (lamelle pseudo-Dufour).

Debitage. Flakes, blades, bladelets and microblades are represented by both unretouched items and pieces with secondary treatment.

Flakes. These consist of 39 unretouched pieces, one core tablet and one tool on a flake. The majority of flakes (28) are noncortical. Two are completely cortical and the remainder are partially cortical.

Blades. They consist of 15 unretouched pieces, 2 crested blades, one core tablet on a blade and 6 blades modified by retouch. In general, blades are noncortical (16 pieces). Incurvate and twisted profile types occur with the same frequency (8 pieces each), 3 blades have flat profiles and the rest are unidentifiable.

Bladelets. Eight bladelets are unretouched and 2 are retouched. The profile types are as follows: 4 flat, 3 incurvate, 2 twisted and one unidentifiable.

Microblades. Out of a total of 5 microblades, 3 are retouched. The profile types are: one flat, one incurvate, one twisted and two unidentifiable.

Core re/preparation pieces. This category of artifacts is represented by 2 crested blades, one core tablet on a blade and one core tablet on a flake.

INTER-LEVEL AND UNIT COMPARISONS

This analysis consists of two parts. The first is devoted to upper Units A-E which contain poor artifact samples and, consequently, need only be briefly summarized. On the other hand, the analysis of Units F, G and H will be done in much greater detail as these assemblages are quite rich in artifacts and/or characteristic types.

I. *Analysis of Units A-E*

The lithic assemblages of Units A-D are characterized by similar techno-typological patterns. Despite the paucity of artifacts, it is possible to discuss their main features: the predominance of double-platform opposed cores for blade/let production; characteristic blades,

bladelets and microblades; a good representation of burins; and the presence of a backed microblade.

The flint assemblage of Unit E, although represented by only a few pieces, is characterized by two very distinctive types - a bladelet carinated core and a carinated burin, which are totally absent in assemblages of Units A-D.

II. ***Analysis of Units F, G and H***

As seen from the artifact descriptions, the assemblages of Units F, G, and H do not have the same statistical values. Levels Fb1-Fb2, Gb1-Gb2, Gc1-Gc2, and Gd are represented by a more or less significant quantity of both debitage, core-like pieces and tools suitable for various detailed analyses. The assemblages of levels Fa1-Fa2, Fa3 and Ga are only suitable for some primary flaking analyses, while the assemblages of level Fc1-Fc2 and Unit H produced insufficient numbers of artifacts (Tables 2 and 3).

At the same time, the general characteristics of the artifacts and the peculiarities of the studied assemblages allow us to combine them under their respective Units for the general analysis. First, we will discuss the common industrial features of the assemblages of Units F, G and H.

Technological common features

- Core-like pieces are characterized by a predominance of bladelet cores for bladelet (*sensu stricto*) and microblade production with a striking prevalence of so-called carinated cores.

- Accordingly, debitage categories show a predominance of blades, bladelets and microblades over flakes, aside from the numerically poor assemblages of levels Fa1-Fa2, Ga and Unit H (Table 5). Moreover, the clear dominance of debitage with blade/let metrical proportions is due to the presence of bladelets and microbladelets in all levels of Units F and G without exception. The only assemblage which does not fit this pattern is Unit H, and this is clearly due to the small sample of items with blade/let metrical proportions (25 pieces).

	Fa1-Fa2	Fa3	Fb1-Fb2	Fc	Ga	Gb1-Gb2	Gc1-Gc2	Gd	H
Flakes	49.07	44.17	35.76	36.84	47.47	38.38	38.59	41.02	51.25
Blades	17.59	16.86	6.25	15.78	19.19	16.56	20.66	19.23	30.00
Bladelets	22.22	16.06	13.02	21.05	18.18	22.02	25.28	23.33	12.50
Microblades	11.11	22.89	44.96	26.31	15.15	23.03	15.45	16.41	6.25
Total	99.99	99.98	99.99	99.98	99.99	99.99	99.98	99.99	100.00

Table 5. Siuren-I, Units F, G, and H: Blanks.

Typological common features

- The non-geometric microliths category is one of the main characteristics of the tool-kits in all levels of Units F, G and H, both morphologically and numerically (Table 4). Moreover, for all of the previously mentioned statistically significant tool-kits (levels Fb1-Fb2, Gb1-Gb2, Gc1-Gc2 and Gd), the proportions of non-geometric microliths are extremely high - ranging from 49.67% to 64.18%. These percentages could be higher if we were not taking into account pieces with marginal and/or irregular retouch and unidentifiable tools. Aside from this, the non-geometric microliths of Units F, G and H are characterized by a great predominance of pieces with fine and/or semi-steep marginal retouch (mainly, different variations of the lamelle Dufour type), while abruptly retouched pieces are very poorly represented.

- Among regular (not microlithic) pieces with secondary treatment, different carinated tools and types with lamellar retouch are also very characteristic, although not numerous. These types, in association with bladelet carinated cores, show the clear Aurignacian character of all assemblages from Units F, G and H.

Thus, the common techno-typological industrial features of all assemblages under discussion surely allow us to consider them as Aurignacian. Moreover, the high proportion and even predominance of Aurignacian non-geometric microliths additionally testify to the fact that we are dealing not with just any Aurignacian industry, but with an Aurignacian industry of the type Krems-Dufour.

Despite the industrial similarities of Units F, G and H discussed above, there are also some obvious differences between them. These differences, which will be listed in detail below, separate Unit F, on the one hand, from Units G and H, on the other. As already mentioned, the assemblages from all levels of these three units are not of the same statistical value and, therefore, the basis for our analysis was mainly the assemblages of levels Fb1-Fb2, Gb1-Gb2, Gc1-Gc2 and Gd. At the same time, even the incomplete characteristics of the assemblage from Unit H in general correspond well to the main features of the other units.

		Fa1-Fa2	Fa3	Fb1-Fb2	Fc	Ga	Gb1-Gb2	Gc1-Gc2	Gd	H
	Flat	4.17	7.50	8.36	25.00	27.78	15.60	15.88	4.39	40.00
	Incurvate	33.33	20.00	20.74	50.00	16.67	36.70	33.78	45.05	30.00
Bladelets	Twisted	50.00	67.50	62.54	25.00	22.22	13.76	37.84	32.97	20.00
	Unidentif.	12.50	5.00	8.36	0.00	33.33	33.94	12.50	17.59	10.00
	Total	100	100	100	100	100	100	100	100	100
	Flat	0.00	15.79	6.37	10.00	13.33	22.81	17.68	14.06	20.00
	Incurvate	25.00	15.79	18.05	30.00	46.67	31.58	39.78	28.13	20.00
Microblades	Twisted	75.00	66.67	65.83	60.00	6.67	14.91	30.39	40.63	20.00
	Unidentif.	0.00	1.75	9.74	0.00	33.33	30.70	12.15	17.18	40.00
	Total	100	100	100	100	100	100	100	100	100

Table 6. Siuren-I, Units F, G, and H: Bladelet and microblade profiles.

Technological differences

Units G and H are characterized by the following general tendencies:

- a predominance of bladelets (*sensu stricto*) over microblades; the only exception is the assemblage from level Gb1-Gb2, which contains about equal proportions of bladelets and microblades (Table 5);
- a predominance of flat and incurvate profiles for bladelets and microblades (approaching 50%), while twisted profiles are characteristic of no more than 35% of all, including unidentifiable, pieces (Table 6).

Unit F, on the other hand, is characterized by its own general tendencies:

- a predominance of microblades over bladelets, the only exception being the assemblage from level Fa1-Fa2 (Table 5);
- a predominance of twisted profiles for bladelets and microblades (more than 60%), while flat and incurvate profiles are characteristic of no more than 35% of all, including unidentifiable, pieces (Table 6).

Typological differences

The rather striking technological dissimilarities between Units F, G and H are related and thus should be explained by the different internal structures of so-called carinated pieces.

Units G and H tend to be characterized by bladelet carinated cores with flat and incurvate flaking surfaces.

Unit F, on the contrary, tends to contain more carinated tools and pieces with lamellar retouch - thick-shouldered endscrapers. Moreover, when bladelet carinated cores are present, they have mostly twisted flaking surfaces; this is also true for other carinated pieces as well.

So, the different utilization (for morphological tools) and flaking (for morphological cores) of different carinated pieces is the main reason for the peculiar technological and metrical characteristics of bladelets (*sensu lato*) and their production between Unit F and Units G and H.

Some other typological differences are more evident and can be distinguished by traditional means.

Units G and H have the following distinctive typological features (Table 4):

- the presence of Krems points on both bladelets and microbladelets;
- the proportion of bladelets (*sensu stricto*) with fine and/or semi-steep lateral retouch ranges from 18 to 25% of all bladelets (*sensu lato*) with this type of retouch;
- the proportion of microblades with fine and/or semi-steep lateral retouch is about 75-82%;

- the proportion of alternatively retouched pieces ranges from 72 to 82 % of all bladelets (*sensu lato*) with fine and/or semi-steep lateral retouch;
- the total number of genuine lamelles Dufour (with inverse and alternate retouch) is 77-83% of all bladelets (*sensu lato*) with fine and/or semi-steep retouch, whereas inversely retouched pieces are represented by just a few pieces;
- on the other hand, the proportion of lamelles pseudo-Dufour (with obverse and bilateral obverse retouch) ranges only from 16.7 to 20% of all bladelets (*sensu lato*) with fine and/or semi-steep lateral marginal retouch;
- the presence of quite a number of typical Middle Paleolithic tools, absent only in the assemblage of level Ga (this assemblage contains the smallest number of pieces with secondary treatment among all levels of Unit G).

Unit F, on the other hand, has other distinctive typological features (Table 4):

- a complete absence of Krems points;
- the near absence of bladelets (*sensu stricto*) with fine and/or semi-steep lateral marginal retouch - only 3 pieces (4.05%);
- microblades are almost exclusively characterized by fine and/or semi-steep lateral marginal retouch - (69 pieces or 95.95%);
- the proportion of alternately retouched pieces is only 20.27% of all bladelets (*sensu lato*) with fine and/or semi-steep marginal lateral retouch;
- the total number of genuine lamelles Dufour (with inverse and alternate retouch) has also dropped to 59.46%, and it is worth noting that among these pieces a number of inversely retouched items prevails over alternate retouch ones;
- the proportion of lamelles pseudo-Dufour (with obverse and bilateral obverse retouch) reaches 40.54% for this kind of non-geometric microliths;
- the absence of any pieces with secondary treatment which could be classified as Middle Paleolithic tool types.

Therefore, on the basis of these techno-typological industrial differences between the assemblages of Unit F and Units G and H, it seems reasonable to consider them as different and to subdivide them into two subtypes within the framework of the Siuren-I Aurignacian of Krems-Dufour industries.

DISCUSSION

Some Comparisons of the Results of the 1920s vs. 1990s Excavations of the Upper Paleolithic Sequence at Siuren-I

The location of our excavation area adjacent to G.A. Bonch-Osmolowski's richest artifact-bearing squares and the basic similarity of the general stratigraphy of these two areas allows us to make methodologically valid comparisons between the new and old excavations.

The Upper Layer of the 1920s excavations corresponds stratigraphically to Strata 4-9 (archaeological Units A-E) of the new excavations. Using the composition of the new excavation stratigraphy to infer the depositional character of the Upper Layer of the previous excavations (which Bonch-Osmolowski divided into 3 horizons), it has become clear why the industrial techno-typological characteristics of the previous excavations are not homogeneous. The larger part of the Upper Layer lithic assemblage is technologically characterized by single and double platform cores for blade/let production and typologically by numerous backed bladelets, including Gravette points (Bonch-Osmolowski 1934:152-154; Vekilova 1957:277-283). On the basis of these features of the Upper Layer, G.A. Bonch-Osmolowski defined it as Upper Aurignacian following the work of Abbé H. Breuil, with whom he was personally acquainted. Since the 1930s, it has become evident that the Upper Layer assemblage would best correspond to D. Peyrony's definition of the Upper Perigordian/Gravettian. Taking into consideration the present data on Crimean Upper Paleolithic research and particularly the material from Buran-Kaya III (excavations by A.A. Yanevich in the 1990s), the general Late Gravettian/Epi-Gravettian character of the Siuren-I Upper Layer assemblage has become obvious. At the same time, however, this assemblage also contains some non-Gravettian tool types. Specifically, these include 6 crescents, 3 carinated endscrapers/bladelet carinated cores, and 9 bladelets with fine marginal retouch, including an item with alternate retouch (Vekilova 1957:280-281). As these tool types were considered by both G.A. Bonch-Osmolowski and E.A. Vekilova to be indicators of the generic links between the Siuren-I Upper Layer assemblage, the Siuren-I Middle Layer assemblage, and the "Azilian"/ Shan-Koba Late Paleolithic Crimean industries, the tool types were placed in the context of the unilinear evolutionary development of the Crimean Upper Paleolithic.

This interpretation should not be regarded as the only possibility. The new site stratigraphy allows us to propose a different interpretation. The presence of some Aurignacian types (carinated pieces and bladelets with fine marginal retouch) can originate in the Upper Layer from Unit E of the 1995 excavations since it is clearly techno-typologically linked to Unit F's Aurignacian industry. Although not found during the new excavations, the occurrence of 6 crescents in the "site periphery area" (Vekilova 1957:281) can also be regarded as an admixture from the sparse Shan-Koba Late Paleolithic layer. On the other hand, the assemblages of Units A-D of the new excavations correspond well to Bonch-Osmolowski's Upper Layer Late Gravettian/Epi-Gravettian component. Therefore, we consider the Upper Layer assemblage of Bonch-Osmolowski's excavations to be Late Gravettian/Epi-Gravettian, with the addition of some intrusive Aurignacian and Late Paleolithic typological elements. The complex, non-uniform, and at least partly disturbed stratigraphy of this Upper Layer seems to be the main reason for the heterogeneous character of the old assemblage.

The Middle Layer of the 1920s excavations corresponds well to Strata 10-12 (archaeological Unit F) of the new excavations. This Middle Layer was subdivided during Bonch-Osmolowski's excavations into 2-3 horizons, depending on the thickness of the sediments (Vekilova 1957:243-248). Four archaeological levels in Unit F were also stratigraphically defined during the 1995 excavations. As seen from the description, general characteristics, and inter-level comparison of the Unit F assemblages, it is possible to argue for the homogeneous character of these levels. This concords with Bonch-Osmolowski's conclusions. There are, however, two main typological differences between the assemblages of

the old Middle Layer (Bonch-Osmolowski 1934:152; Vekilova 1957:272-277) and our Unit F. The first difference is the absence of any Middle Paleolithic tool types in Unit F and their presence in the Middle Layer assemblage (although Vekilova counts only 6 pieces). Such a distinction may not be real since M.V. Anikovich, who recently studied the 1920s Siuren-I lithics stored in St. Petersburg, noted that "there are no obvious archaic forms (sidescrapers, Mousterian points, small hand axes)" in the Middle Layer (Anikovich 1992:224). Thus, this distinction can be explained by the typological appearance of flakes with marginal and/or irregular retouch which sometimes resemble sidescrapers and points. The second difference is more serious. Specifically, there is only a small number (26 pieces out of 170-200 tools) of retouched bladelets (*sensu lato*) in the Middle Layer assemblage, whereas retouched bladelets (*sensu lato*) are clearly the predominant tool category in the Unit F assemblages. There are two possible explanations for such a different frequency of retouched bladelets (*sensu lato*) in these two groups of assemblages. First, one could argue that this discrepancy is due to the spatial distribution of various tool categories across the site. While such a possibility cannot be completely excluded, the location of the new excavations immediately adjacent to the richest artifact-bearing squares of the old excavations should not lead to such a large difference in tool categories. There is, however, a second, more likely possible solution to this problem. The general size of the retouched bladelets in the Unit F assemblages is small. According to our definition, they are mostly microblades. The small size of the retouched bladelets in the old Middle Layer assemblages was also noted by G.A. Bonch-Osmolowski (1934:152) and E.A. Vekilova (1957:276). In this case, we can definitely assume that the unsystematic screening of Middle Layer sediments during the 1920s excavations is the principal reason for the rather poor representation of tiny retouched bladelets in the old Middle Layer assemblages. The proposed explanations for the existing typological differences between the old Middle Layer assemblages and the new Unit F assemblages make these industries quite similar in general terms. Accordingly, they can be regarded basically as stratigraphically and techno-typologically representative of the same industry, with some subjective differences for the old assemblage.

The Lower Layer of the 1920s excavations corresponds well to Strata 14-15d (archaeological Unit G) of the new excavations. As it was the thickest sedimentary block defined by G.A. Bonch-Osmolowski, he subdivided it into 7-8 artificial, non-stratigraphic horizons (Vekilova 1957:243-245). We recognized 4 archaeological levels within Unit G during the 1996 excavations based on stratigraphic grounds. As with the comparison of the old Middle Layer and the new Unit F, the old Lower Layer assemblage and the new Unit G assemblages are of a homogeneous character and possess the same techno-typological features, taking into consideration the old Lower Layer artifact descriptions of G.A. Bonch-Osmolowski (1934:148-152), E.A. Vekilova (1957:258-272), and M.V. Anikovich (1992:224). Only one major typological difference exists between these two groups of assemblages: the absence of any scaled tools (*pièce esquillèe* type) in the Unit G assemblages compared to their presence in the old Lower Layer assemblage. We are inclined to explain such a typological difference by the possibility of a limited distribution of scaled tools at the site, especially given their small number in comparison to the total of some 700 tools (29 pieces in Vekilova's counts (1957:266-268) and 14 pieces in Anikovich's counts (1992: 224)). As for the intriguing question of the real role of Middle Paleolithic tool types in the old Lower Layer assemblage, it is now clear from the structure of the Unit G assemblages that these archaic forms are a part of these Upper Paleolithic assemblages. Further, we did not find any signs of a separate Middle

Paleolithic Unit or level from which these Middle Paleolithic tool types could have intruded into the seemingly perfectly *in situ* Upper Paleolithic levels of Unit G. The other main techno-typological features of the old Lower Layer assemblage and the new Unit G assemblages are basically the same. Despite the lack of systematic screening in the 1920s, this similarity includes the proportions of retouched bladelets in both assemblage groups, due to the greater size of the Lower Layer/Unit G bladelets compared to those of the old Middle Layer.

A further note should be added here. When discussing the similarity of the techno-typological features of the old and new Siuren-I Upper Paleolithic assemblages, we refer to the general representation and characteristics of major cores, debitage, tool categories, and tool types. When G.A. Bonch-Osmolowski and E.A. Vekilova worked with the Siuren-I assemblages in the early 1930s and early 1950s, respectively, terms such as Lamelle Dufour, Krems point, and their morphological definitions did not exist or were not in common practice. The recent publication of M.V. Anikovich (1992) does not help in this regard since he presented only the general composition of the old Middle and Lower Layer assemblages without the necessary details.

The assemblage from new Unit H (Stratum 17) does not have any stratigraphic analog in the 1920s excavations. This can be explained by the limited spatial distribution of Unit H as well as the very small size of the two 1920s excavation areas which actually went below the Lower Layer deposits (Vekilova 1957:242). The character of the assemblage from Unit H is definitely Upper Paleolithic and is quite similar to the assemblages from Unit G. Further conclusions concerning Unit H will be possible after the completion of the 1997 excavations.

CONCLUSIONS

The new excavations at Siuren-I, conducted between 1994 and 1996, provide an opportunity to take a new, more detailed look at this important Upper Paleolithic site. As our excavations are not yet finished, the 1997 field season will see the completion of several investigations, including the final analysis of archaeological Unit H. Nevertheless, we can present the following conclusions about the site and its context.

1. The assemblages of Archaeological Unit F (old Middle Layer), as well as the Unit G (old Lower Layer) and Unit H assemblages, correspond to industries of the Aurignacian of Krems-Dufour type. Moreover, these assemblages are quite different within the framework of the Aurignacian of Krems-Dufour type and should be separated into two subtypes: 1) the assemblages from Unit F, and 2) the assemblages from Units G and H. Their detailed characteristics are discussed above in the inter-level and inter-unit comparisons. This interpretation demonstrates the correctness of Bonch-Osmolowski's preliminary assumption that the assemblages of the Lower Layer of Siuren-I were similar to those of Krems-Hundssteig, Austria (Bonch-Osmolowski 1934:154). Similarly, it corroborates Kozlowski's and Hahn's placement of the Lower and Middle Layer assemblages of Siuren-I in the context of the Central and Eastern European Aurignacian of Krems-Dufour type industries. On the basis of the new data provided by the 1990s excavations, this interpretation has been

strengthened with greater detail and stratigraphic control, as well as with additional techno-typological subdivisions.

2. The recognition that Middle Paleolithic tool types are an integral part of the assemblages of Units G and H shows the real relationship between the Siuren-I subtype of the Aurignacian of Krems-Dufour and the problem of the Early Upper Paleolithic. Furthermore, this point brings Siuren-I into the context of the Middle to Upper Paleolithic transition.

3. The proposed division of the Aurignacian of Krems-Dufour at Siuren-I into two subtypes opens the possibility for a general consideration of the industrial development of the Aurignacian of Krems-Dufour type through time.

4. It is possible to discuss the Central and Eastern European sites with industries of Aurignacian of Krems-Dufour type which are techno-typologically related to Siuren-I. The assemblage subtype from Units G and H shows some general similarities to the industries of Krems-Hundssteig (Austria) (Laplace 1970; Hahn 1977) and to the Aurignacian sites of Banat (southwestern Romania), especially Tincova and Romanesti-Dumbravita I, layer III (Mogosanu 1972; Chirica 1996). The assemblage subtype from Unit F of Siuren-I, however, has features similar to the industries of Gora Pulawska II (Poland) (Sachse-Kozlowska 1978; Kozlowski 1983) and to Kostenki I (Russia), layers II and III (Sinitsyn 1993).

5. The absolute chronology of the Upper Paleolithic sequence of Siuren-I is not yet clear. The new AMS dates (ca. 29,000 B.P.), however, indicate that a proposed date of the Last Glacial Maximum of Pleniglacial B (20,000 - 18,000 B.P.) for old Lower layer/new Unit G and old Middle layer/new Unit F should definitely be rejected. These new AMS dates only represent a starting point for further datation, however. This is because the dates occur in reverse order: level Fb2 was dated to 29,950 ± 700 B.P., while level Ga, which is stratigraphically older, was dated to 28,450 ± 600 B.P. If we accept the AMS date for level Fb2, it seems reasonable to infer a soil 2 (Denekamp) Würm Interpleniglacial time span for Unit F, and, preceding it, after soil 1 (Hengelo) Würm Interpleniglacial time span for Unit G. We assume this chronological position for Unit G as its uppermost level (Ga) is separated from level Fb2 not only by the third rockfall horizon (Stratum 13) but also by some sterile sediments above and below level Fc, in addition to level Fc itself, for a total thickness of sediments of about 1 m (Strata 12-13a; see profile III, Fig.2).

Finally, we would like to emphasize the fact that the data on the new Siuren-I 1994-95 excavations represent only the first step in our investigations and understanding of the site. More work has to be done in the areas of excavation, lithic analysis, description of non-lithic artifacts (bone tools and mollusk shell pendants), stratigraphy, pollen analysis, faunal and microfaunal analysis, mollusk analysis, and the interpretation of all of these sources of data. All of these subjects will be discussed in forthcoming publications.

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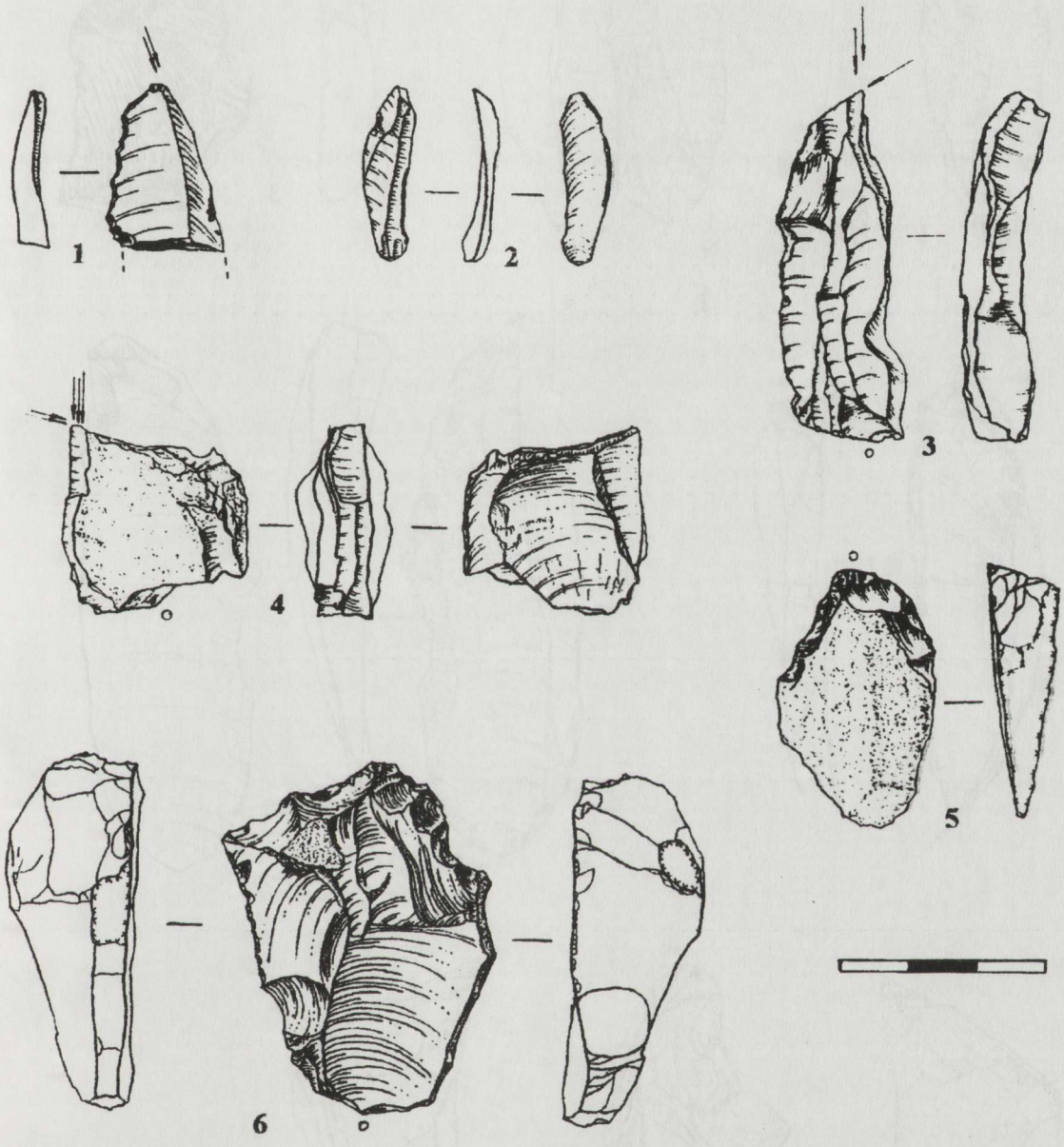

Fig. 3 Siuren-I, levels Fa2 (1-2, 6) and Fb2 (3-5). 1: burin on truncation; 2: microblade with fine alternate marginal retouch - lamelle Dufour; 3, 4: dihedral burins; 5: ogival endscraper; 6: thick shouldered endscraper.

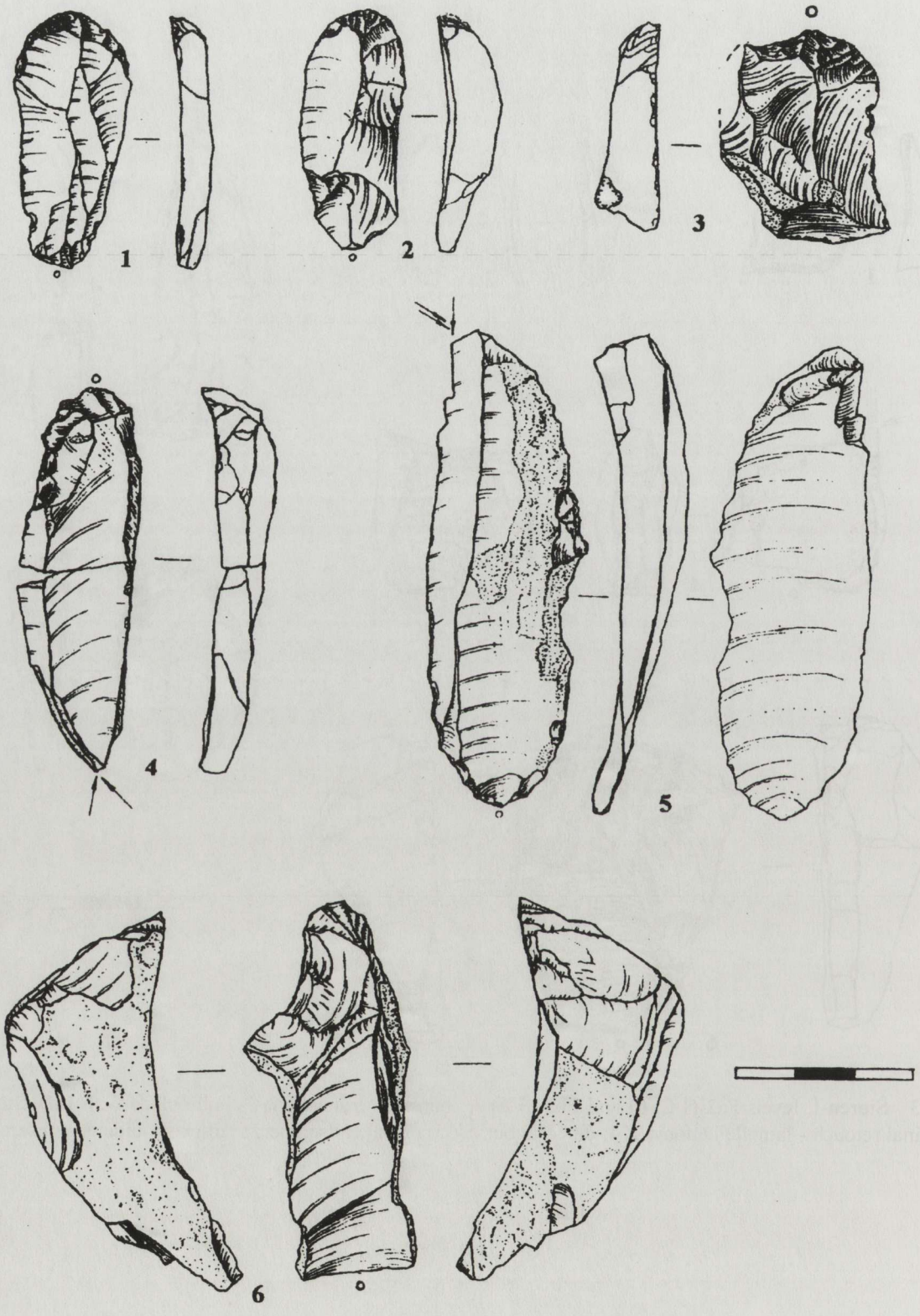

Fig. 4 Siuren-I, levels Fa2 (3) and Fb2 (1, 2, 4-6). 1, 2: simple endscrapers on blades; 3: flat shouldered endscraper; 4: simple endscraper/dihedral burin; 5: dihedral burin; 6: thick shouldered endscraper.

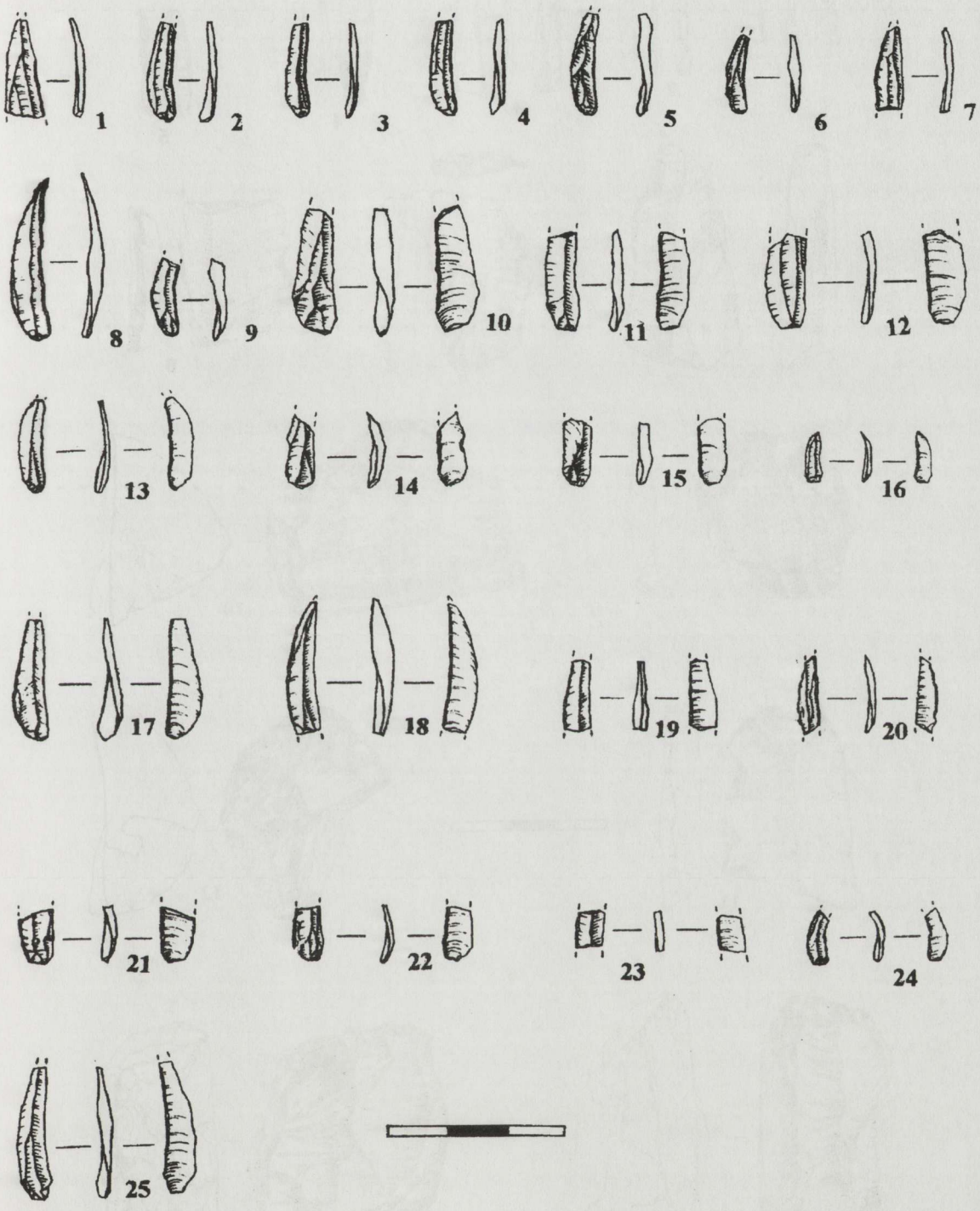

Fig. 5 Siuren-I, level Fb2 (1-25). 1-8: microblades with fine and/or semi-steep obverse marginal retouch - lamelles pseudo-Dufour; 9: microblade with bilateral obverse fine marginal retouch - lamelle pseudo-Dufour; 10-16, 24, 25: microblades with fine and/or semi-steep inverse marginal retouch - lamelles Dufour; 17-23: microblades with fine and/or semi-steep alternate marginal retouch.

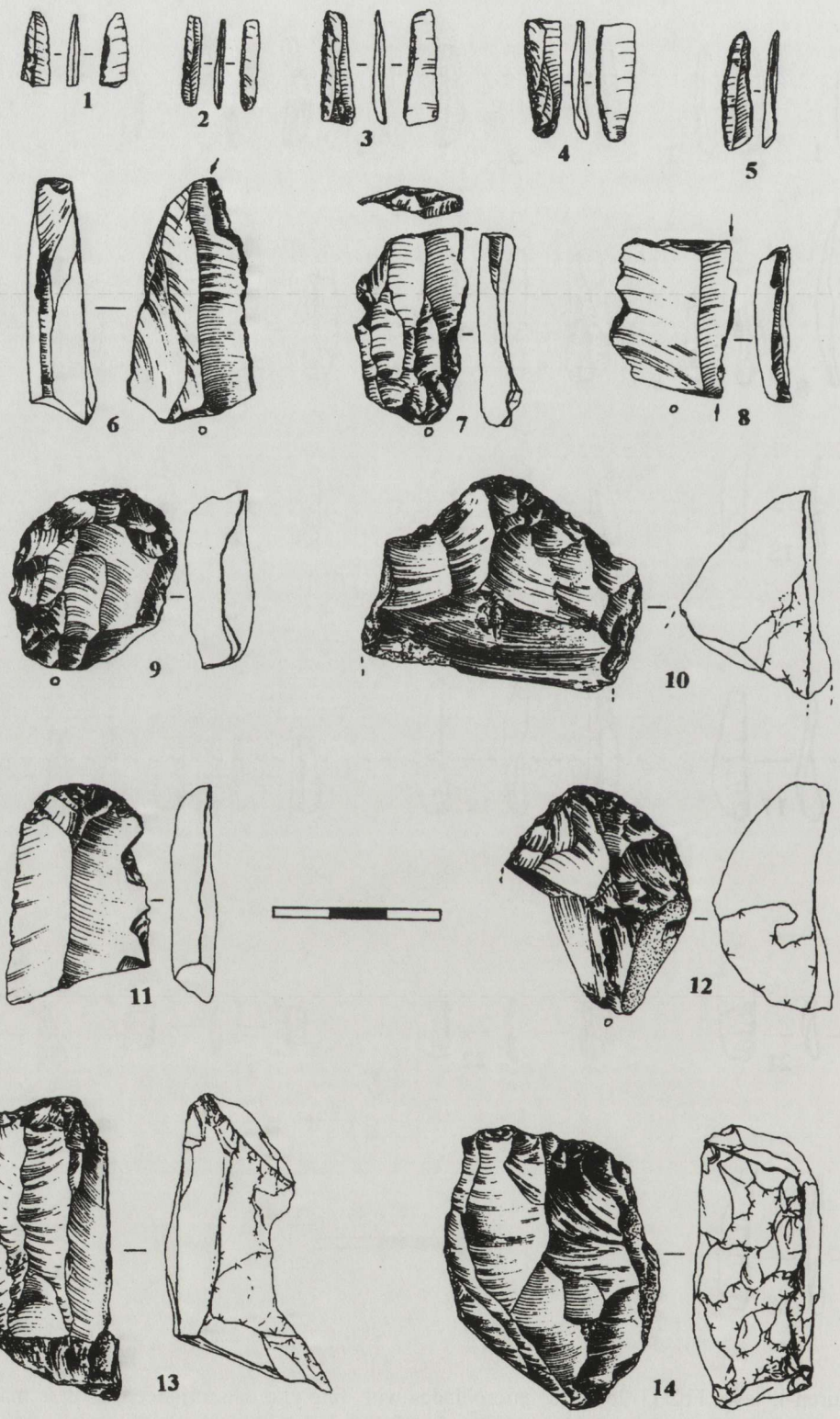

Fig. 6 Siuren-I, levels Ga (5, 9, 11) and Gb1-Gb2 (1-4, 6-8, 10, 12-14). 1-4: microblades with fine and/or semi-steep alternate marginal retouch - lamelles Dufour; 5: Krems point on microblade; 6: burin on a lateral retouch; 7: transverse burin on a natural surface; 8: double angle burin; 9: unilateral/flake endscraper; 10: thick shouldered endscraper; 11: simple endscraper on blade; 12: atypical carinated endscraper; 13: bladelet core; 14: blade core.

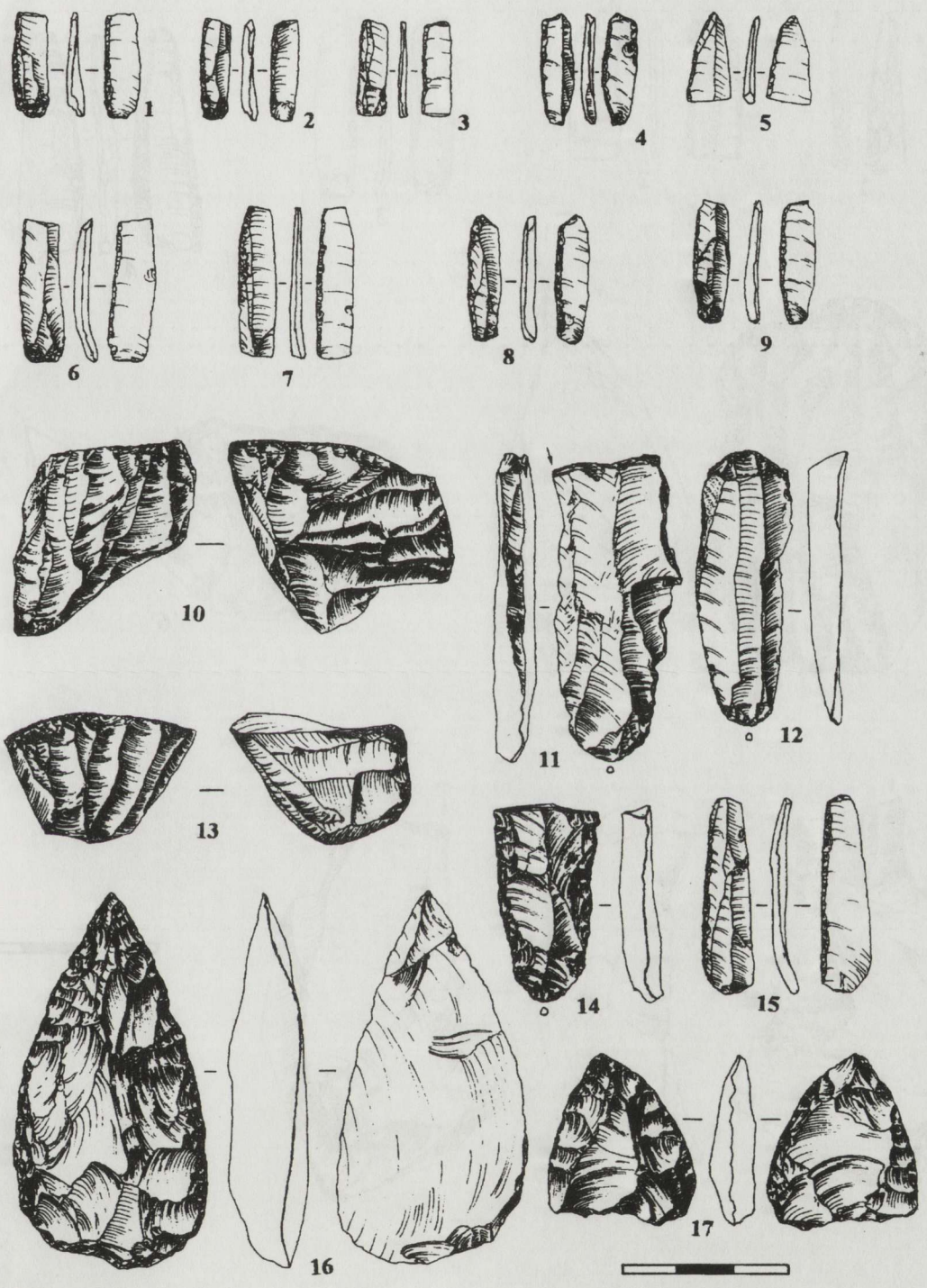

Fig. 7 Siuren-I, level Gc1-Gc2 (1-17). 1-4, 7-9: microblades with fine and/or semi-steep alternate marginal retouch - lamelles Dufour; 5: Krems point variant on bladelet with alternate retouch; 6, 15: bladelets with fine and/or semi-steep alternate marginal retouch - lamelles Dufour; 10, 13: Siuren-type of bladelet carinated cores; 11: angle burin; 12: simple endscraper on blade; 14: blade with Aurignacian-like bilateral scalar semi-steep retouch; 16: unifacial sub-leaf point; 17: bifacial semi-leaf/triangular point.

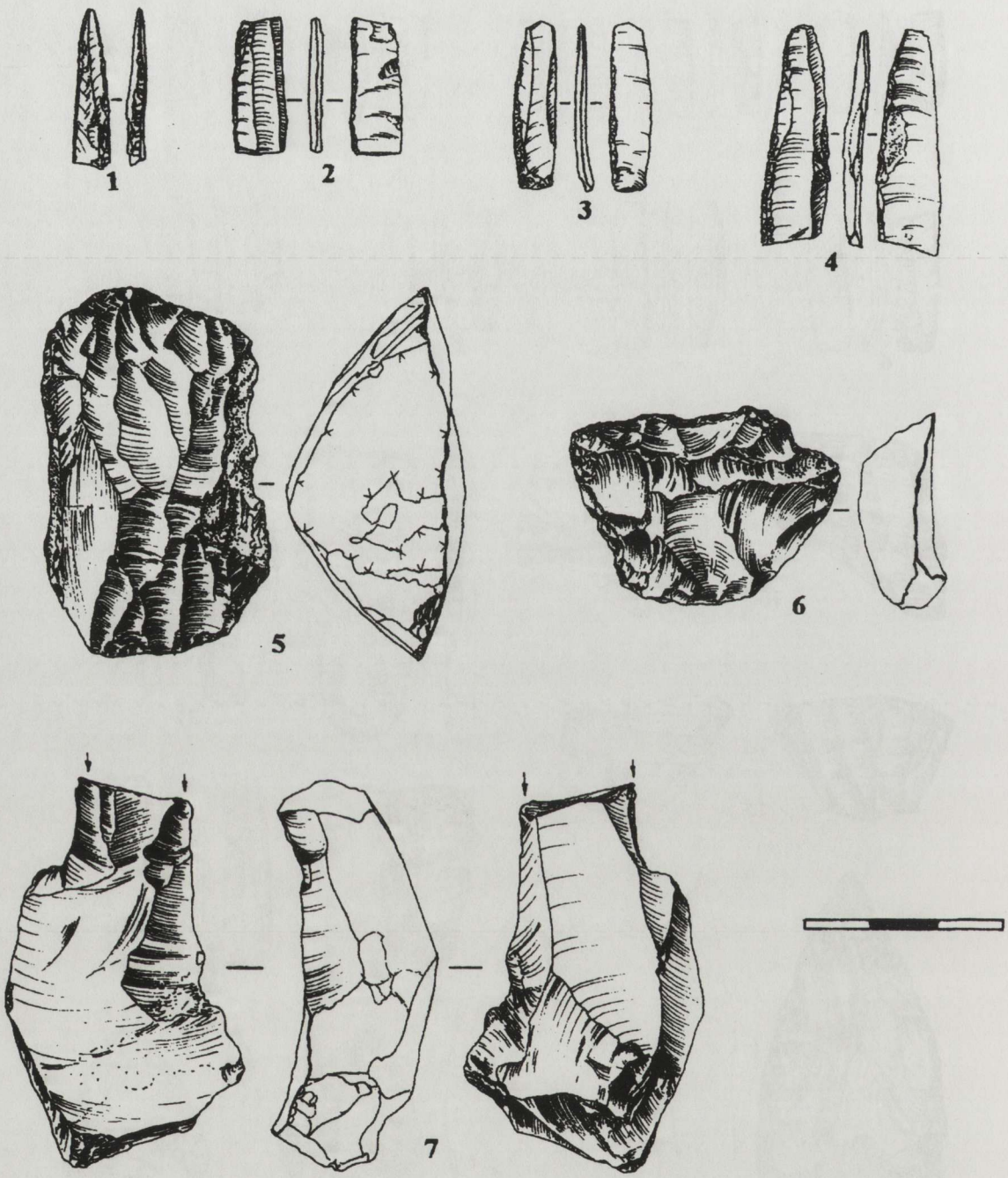

Fig. 8 Siuren-I, level Gc1-Gc2 (1-7). 1: Krems point on microblade; 2, 4: bladelets with fine and/or semi-steep alternate marginal retouch - lamelles Dufour; 3: microblade with fine and/or semi-steep alternate marginal retouch - lamelle Dufour; 5: bladelet carinated double platform core; 6: unifacial canted scraper; 7: double angle burin.

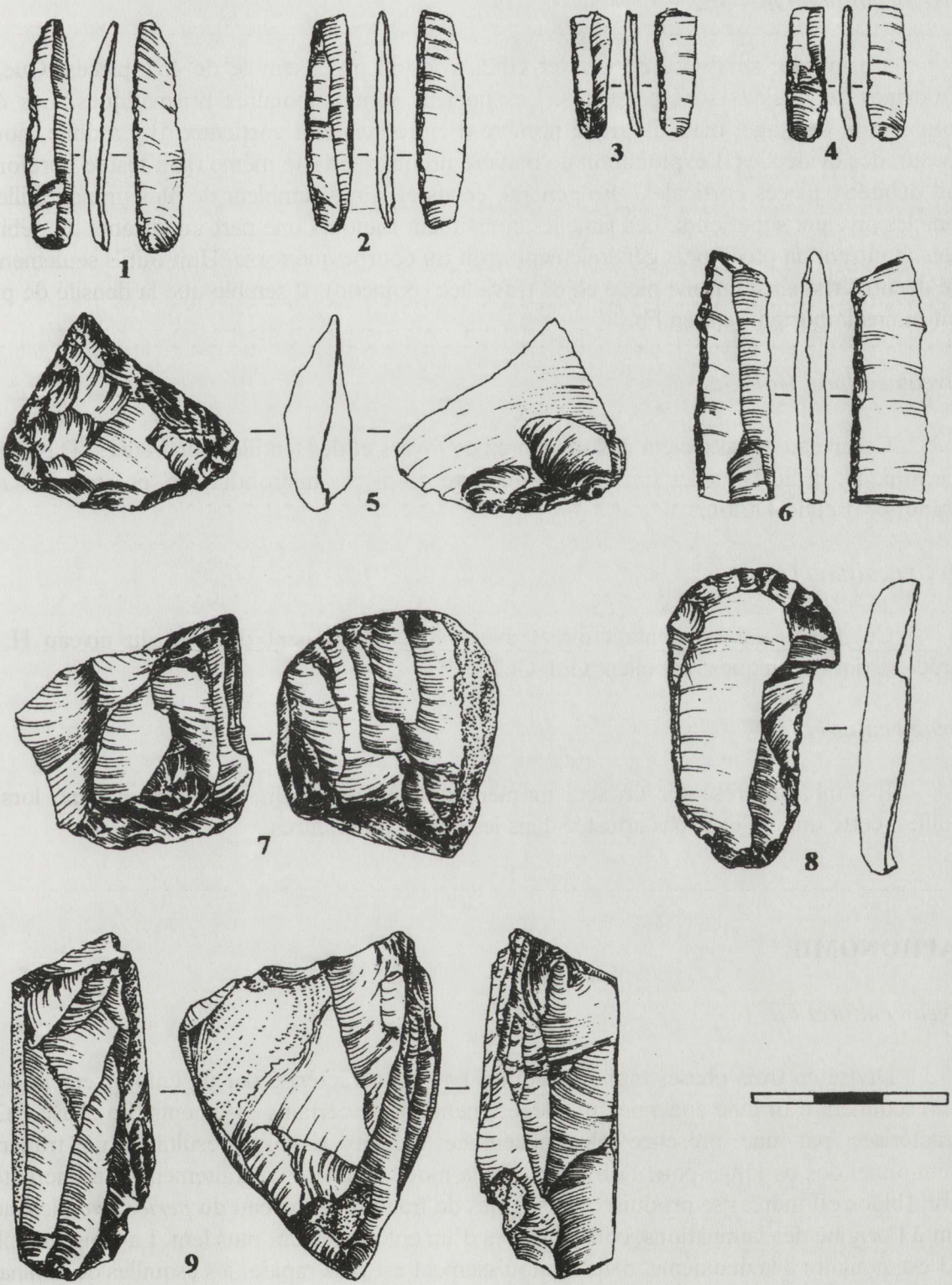

Fig. 9 Siuren-I, level Gd (1-9). 1, 2, 6: bladelets with fine and/or semi-steep alternate marginal retouch - lamelles Dufour; 3: microblade with fine and semi-steep alternate marginal retouch; 4: bilaterally backed microblade; 5: unifacial point with basal thinning; 7: bladelet carinated core; 8: endscraper on a flake with bilateral obverse retouch; 9: bladelet core.

Niveau culturel Gb1-Gb2

Ce niveau, subdivisé en Gb1 et Gb2, a fourni un ensemble de 451 pièces. Quelques préformes de nucleus sont présentes. Les nucleus sont unipolaires prismatiques. Les éclats dominent le débitage, mais un grand nombre d'entre eux sont corticaux. Il y a donc, pour ce niveau, des évidences d'exploitation de matière première au site même (soit testée : préformes, soit débitée : pièces corticales). En général, éclats et lames semblent de plus grande taille que dans les niveaux supérieurs. Les lamelles constituent toujours une part importante du débitage, mais montrent un profil plus généralement droit ou courbe que torse. Huit outils seulement ont été découverts, ainsi qu'une pièce en os travaillée (poinçon). Il semble que la densité de pièces soit moins importante qu'en Fb.

Niveau culturel Gc1-Gc2

Ce niveau est associé à des structures de foyers et des lentilles cendreuses. Du point de vue lithique, il faut signaler une grande quantité de pièces microlithiques, pointes de Krems, Dufour et pseudo-Dufour.

Niveau culturel Gd

Ce niveau est en contact direct avec Gc et faiblement dissocié du niveau H. Les caractéristiques lithiques rappellent Gc1-Gc2.

Niveau culturel H

Il semble représenter un seul moment d'occupation. Un foyer fut exhumé lors des fouilles; cette unité n'était pas attestée dans les études antérieures.

TAPHONOMIE

Niveau culturel Fa

Divisé en trois phases taphonomiques, Fa1 est caractérisé par un enfouissement rapide et un sédiment d'origine éolienne qui a légèrement abrasé certains ossements. La phase Fa2 est caractérisée par une présence plus accentuée d'éclats osseux, résultat d'un traitement intentionnel des os longs pour l'obtention de la moelle; suite à ce traitement et à l'activité de l'abri (blocs effondrés) se produisent des lignes de fracture au niveau du *periosteum*, lesquelles sont à l'origine des laminations, conséquences d'un enfouissement plus lent. La troisième phase Fa3 est similaire à la deuxième, mais l'enfouissement est plus rapide, les esquilles de lamination se trouvent fréquemment attachées aux ossements, sans dispersion, donc sa formation est postérieure à l'enfouissement et vraisemblablement due à la double action du poids des sédiments et du piétinement.