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20 - THE SIUREN I ARCHAEOLOGICAL INDUSTRIAL SEQUENCE SEEN THROUGH THE SITE'S HUMAN OCCUPATION EVENTS

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Introduction

Now, after the description and analysis of the Siuren I 1990s excavation archaeological finds with detailed comparisons with the published and unpublished records of the site's 1920s excavations, and new clarifications of the complete archaeological context at Siuren I, we are able to "reconstruct" the Siuren i archaeological industrial sequence. For such "reconstruction", not only the data on lithic assemblages and their strata are required, but also all information on other kinds of archaeological material (bone tools and non-utilitarian shell, tooth and antler objects), as well as multidisciplinary data - absolute AMS dates, paleoenvironmental analyses (fauna, microfauna, mollusks) – in order to create summaries for each industry and human occupation event and their characteristics and position within the Crimean and European Paleolithic.

There is another aspect regarding the Siuren I archaeological industrial sequence. As already strongly emphasized in the Preface and Chapter 1, the Siuren I archaeological industrial sequence has always been considered as exclusively containing Upper Paleolithic industries: either for a relatively short time period - Aurignacian alone (e.g., Bonch-Osmolowski 1934) or for the entire Upper Paleolithic (e.g., Vekilova 1957). It is now possible to argue for a much broader industrial and chronological framework for the Siuren I archaeological industrial sequence - from the very end of the Middle Paleolithic to the Final Paleolithic/"Crimean Azilian". The Siuren I rock-shelter has become a key site in Crimean prehistory for this time range.

Altogether the Siuren I archaeological industrial sequence is proposed to contain the following Paleolithic industries related to **seven** human occupation events:
(1) the Middle Paleolithic/Crimean Micoquian Tradition Kiik-Koba type industry in the 1990s Units H and G/1920s Lower layer;
(2) the Upper Paleolithic/Early Aurignacian of Krems-Dufour type industry in the 1990s Units H and G/1920s Lower layer;
(3) the Upper Paleolithic/Late Aurignacian of Krems-Dufour type industry in the 1990s Unit F/1920s Middle layer;
(4) the Upper Paleolithic/Late Aurignacian of Krems-Dufour type industry in the 1990s Unit E/lowest finds of the 1920s Upper layer;
(5) the Upper Paleolithic/Gravettian industry in the 1990s Unit D/3rd horizon in the 1920s Upper layer;
(6) the Upper Paleolithic/Epi-Gravettian industry in the 1990s Unit A and some finds in "Humus Deposits"/2nd horizon of the 1920s Upper layer;
(7) the Final Paleolithic/"Azilian" Shan-Koba type industry of uppermost finds in the 1920s Upper layer.

Based on this archaeological sequence, each industry and human occupation event will be discussed in order from bottom to top. It should be noted that there is significant variability in available information for each human occupation event and associated finds, leading to some clear differences for each summary.

The Middle Paleolithic/Crimean Micoquian Tradition industry of the 1990s Unit H and Unit G/1920s Lower layer

Results of data analysis for the different Siuren I Middle Paleolithic industrial components have been presented in separate chapters here, but the Middle Paleolithic component in the 1990s Units H-G and the 1920s Lower layer was not discussed as a complete find complex. Therefore, on some aspects of the Middle Paleolithic human occupation event and associated artifacts will be described here in more detail than is usual for a summary description.

Lithic assemblages: composition and industrial features

The total number of lithic artifacts is quite limited for this complex. The known artifact quantities from both the 1920s and the 1990s campaigns are as follows: 5 cores, 60 tools and 23 retouch flakes/chips, in total only 88 artifacts. To this number we could probably add about 40 more retouch flakes and chips not identified in the 1920s collections, given the nearly 1 to 1 ratio of tools to retouch flakes/chips in the 1990s collections. On the other hand, estimation of the number of unretouched debitage pieces (first of all, flakes) will probably never be quantified due to the difficulty in morphological separation from Aurignacian flake debitage in the 1990s Units H and G/the 1920s Lower lay-

er collections. Nonetheless, taking into consideration the definite intensive "on-site thinning and rejuvenation" processes for bifacial and unifacial tool treatment and the rarity of cores, the assumed presence of about 60 more flakes would seem to be an optimal maximal estimation to add. Thus, all in all, the Siuren I Middle Paleolithic complex would not exceed about 200 flint artifacts. Accepting the this estimated maximum and the composition of different artifact categories, we can summarize the common techno-typological features of this complex.

Technology

The presence of only non-Levallois radial cores (5 items/about 2.5%), the selection of only flakes as blanks for all 60 tools and consideration of flake size for retouched pieces indicate that flake production was the main and even exclusive aim of primary reduction processes both inside and outside the rock-shelter. Without forgetting some influence of secondary treatment processes to reduce tool size, we are inclined to argue that small- and medium-sized flake production took place - no more than in 4.0 cm long and wide pieces, and only a few with an overall size between 4.0-6.0 cm, taking into consideration metric data for tools. No other specifications on regular primary ("core-like") flaking technology is possible from the available limited data.

Typology

Both small- and medium-sized flake primary production and intensive "on-site thinning and rejuvenation of tools" led to the dominance of small unifacial tools with more than retouched one edge. The exact subdivision of 53 unifacial tools (88.3%) into distinct categories of points and scrapers is impossible because Vekilova (1957) classified all convergent forms as points, which differs from our classification approach. At the same time, this enables us to know the number of all convergent points and scrapers together - 37 items/69.8%. The other 16 unifacial tools are represented by simple, double and transversal scrapers - 15 items/28.3% and 1 transversal denticulated piece (1.9%). Shape types of the unifacial convergent tools are semi- and sub-trapezoidal, -triangular, -crescent and leaf shaped. Various dorsal and ventral thinning techniques are quite typical of both convergent and non-convergent unifacial tools as well. Bifacial tools number 7 pieces (11.7%) and are similar in shape to the unifacial tools. They are also characteristized by a basic "plano-convex " treatment leading, aside from tool shaping, to some flake production (Demidenko 1996, 2004). Production and especially intensive thinning and rejuvenation of both bifacial and unifacial tools are indicated on the numerous retouch flakes/chips. From the 1990s excavations, they can be listed in detail by each defined type: 1 bifacial shaping flake; 2 bifacial thinning flakes; 1 resharpening flake of a bifacial convergent tool's tip; 1 resharpening flake of a unifacial convergent (asymmetric) tool's tip; 17 simple retouch flakes; 1 "Janus/Kombewa" retouch chip from basal ventral thinning of a tool. To these 23 retouch items from the 1990s excavations, 5 additional analogous pieces identified on part of the 1920s collection should be added: 2 bifacial thinning flakes and 3 small resharpening chips of unifacial convergent (asymmetric) tools' tips. The presence of some cortex on dorsal surfaces of 1 bifacial shaping flake (Unit H) and 2 simple retouch flakes (levels Gc1-Gc2 and Gb1-Gb2) are the only possible evidence "on-site production" of tools, while all other 25 retouch pieces from both the 1920s and the 1990s investigations are non-cortical and, by their other morphological features, should be viewed as evidence "on-site thinning and rejuvenation" of tools resulting in such typical "waste products". Here we should also not forget the remarkable presence of a semi-trapezoidal dorsal scraper made on a bifacial shaping flake in level Gc1-Gc2 that points to some selection of tool retouch flakes for subsequent secondary treatment and, at the same time, it also strengthens the assumed paucity of unretouched debitage in this Middle Paleolithic complex.

Numerically, tools and retouch flakes/chips, adding an estimated 40 more pieces for the latter, account for about 60 items each, about 30% each within the assumed total find complex.

All the flint artifact data, taken together with facts supporting quite long distance transportation of flints to the rock-shelter, as for the Middle Paleolithic, we come to the conclusion that mainly finished tools were brought to the Siuren I rock-shelter with further multiple repreparation during probable use in specific activities during the occupation.

Variability in lithic assemblages by archaeological level

Taking into account Anikovich's (1992) comments on the presence of Middle Paleolithic artifacts in all artificial horizons of the 1920s Lower layer, which corresponds to personal observations of the 1920s finds at Kunstkamera Museum in November 1999, and the occurrence of these pieces in all four stratigraphically distinct hearth/ashy levels of the 1990s excavations Units H-G, we can assume similar characteristics for the lithic assemblages associated with each human occupation event during the entire Middle Paleolithic episode at Siuren I, represented only by a small number of flints. Some additional data also confirm this view. Bifacial tools were only found in level Gc1-Gc2 during the 1990s excavations, but retouch flakes from bifacial tool shaping (production), thinning and rejuvenation, aside from level Gc1-Gc2, also occur in Unit H. Among the 1920s Middle Paleolithic flints studied by us in November 1999, two bifacial tools are found in two neighbouring squares but in different artificial horizons - sq. 12-Д/horizon 8 and sq. 12-Е/horizon 5 and two bifacial thinning flakes are in sq. 12-Г/horizon 4 (fireplace) and in sq. 12-Ж/horizon 2. The spatial and depth distribution for these bifacial tools and rejuvenation by-products principally attest to their occurrence throughout the entire sequence of the 1920s Lower layer. Returning to data from the 1990s excavations, identification of other kinds of retouch flakes and chips from repreparation and partially initial formation of probably unifacial tools in all four hearth/ashy levels is also notable as, for example, one Middle Paleolithic unifacial tool type and four retouch flakes/chips were found in level Gd. At the same time, we should recall that level Gc1-Gc2 is characteristized by almost half of all Middle Paleolithic artifacts from the 1990s excavations - 13 tools and 8 retouch flakes (in total 21 pieces/48.8%), while Middle Paleolithic artifacts from the other three hearth/ashy levels are about 2-3 times less common: Unit H - 3 tools and 7 retouch flakes (in total 10 pieces/23.3%), level Gd - 1 tool, 3 retouch flakes and 1 retouch chip (in total 5

pieces/11.6%) and level Gb1-Gb2 - 3 tools and 4 retouch flakes (in total 7 pieces/16.3%). These quantitative data clearly demonstrate that level Gc1-Gc2 is the main one within the Siuren I 1990s Units H-G Middle Paleolithic sequence, deserving some attention in discussion of the nature of Middle Paleolithic human occupations at the site.

Bone tools and non-utilitarian objects

The only kinds of bone and non-utiliatarian objects from the Siuren I 1920s Lower layer/1990s Units H and G collections (Middle and Upper Paleolithic) which can be associated with the Middle Paleolithic Micoquian complex are "unintentional" bone retouchers found during both the 1920s and the 1990s excavations. Initially, Bonch-Osmolowski recognized that "... two bone retouchers (anvils), served for working edges rejuvenation of rather rare archaic (Yu. D. - Middle Paleolithic flint tools) forms" (1934:149) in the Lower layer. Later, Vekilova added to these two bone retouchers nine more similar pieces, but with less intensive use wear, and, importantly, published drawings of the two best items (1957:298 and fig. 26, 12-13 on p. 295). Taking into consideration both the special attention by Bonch-Osmolowski to definition of bone retouchers in the Crimean Paleolithic and his convincing identification of them in several other Middle Paleolithic complexes (Kiik-Koba, upper layer; Chokurcha-I; Adji-Koba and Shaitan-Koba) (Bonch-Osmolowski 1940:117-122) and only two illustrations of such pieces for Siuren I by Vekilova, it is better to stay on the safe side and accept the presence of just two "true" bone retouchers there. Summing up findings of bone retouchers exclusively in the Siuren I Lower layer (not in the Middle and Upper layers at all), as well as their characteristic presence in only Middle Paleolithic sites in the Crimea aside from Siuren I (see in this context data on very recently published and well-photographed bone retouchers from Crimean Micoquian Tradition assemblages at Kabazi-V and Chokurcha-I sites [Yevtushenko 1998; Veselsky 2008; Chabai 2004]), we agree with Bonch-Osmolowski and associate the Siuren I Lower layer 1920s bone retouchers with Middle Paleolithic tools there. Moreover, the "accent" revealed by us on intensive flint tool thinning and rejuvenation secondary treatment processes for the Siuren I Middle Paleolithic complex is in good agreement with the occurrence of bone retouchers there as noted by Bonch-Osmolowski. Similarly, two bone retouchers from level Gc1-Gc2 of the 1990s excavations should be also associated with the Siuren I Middle Paleolithic/Crimean Micoquian Tradition occupation (see also Akmetgaleeva this volume).

On the other hand, all "intentionally made" bone tools and non-utilitarian objects found in the Siuren I 1920s Lower layer/1990s Unit G, in our opinion, are connected to the Early Aurignacian of Krems-Dufour type industry.

Fauna data as indicators of hunting activity and use of its results

This is probably the most difficult aspect to understand clearly with respect to the Siuren I Middle Paleolithic human occupation. The problem arises from the fact that the clearest finds from the 1920s and the 1990s excavations are from both the Middle Paleolithic/Crimean Micoquian Tradition industry and the Upper Paleolithic/Early Aurignacian of Krems-Dufour type industry. Faunal remains from each archaeological layer, unit or level are thus necessarily of "mixed origin" – the results of hunting activity by both Middle and Upper Paleolithic inhabitants of the rock-shelter. How is it possible to resolve this problem of mixing and to separate out specifically Middle Paleolithic fauna ? There are several following possible approaches for such studies.

(1) Keeping in mind the "pure Aurignacian" characteristics for the 1920s Middle layer/ 1990s Unit F assemblages, we could compare fauna species lists from these layer and levels with those for the 1920s Lower layer/ 1990s Units H-G levels to select game animals that occurred only in the latter layer and levels.These animals could only have been hunted by Middle Paleolithic Neandertals.

(2) Then, we could compare all indicative game animals from the Siuren I 1920s Lower layer/1990s Units H and G with the fauna data from Crimean Micoquian Tradition sites to determine possible similarities in hunted species that would strengthen the arguments related to the Middle Paleolithic fauna species selected during the previous step.

(3) Finally, comparing the Siuren I 1920s Lower layer/1990s Units H and G main game animals with the "pure Aurignacian" fauna data from Merejkowski's 1879-1880 excavations could potentially offer insights into final separation of Middle Paleolithic fauna.

Unfortunately, these three studies did not throw actual light on the matter. First, basic fauna representation for the 1920s Lower layer/ 1990s Units H and G and for the 1920s Middle layer/ 1990s Unit F shows the same range of hunted animals:- *Saiga tatarica, Bos* sp., *Equus* sp., *Cervus megaceros, Cervus elaphus* (Vekilova 1957: tabl. 2 on p. 254; 1971: tabl. 3 on p. 124; Lopez Bayon 1998; Patou-Mathis this volume). Stressed by Vekilova, the importance of the absence of *Rangifer tarandus* and *Hyaena spelaea* (although the latter species was not hunted) in the Middle layer and their presence in the Lower layer seems to be dubious because the presence of these two species was established on the basis of only 2 and 4 identified bones in the 1920s excavations, while they were not found during the 1990s excavations at all. Merejkowski's fauna data also do not help to demonstrate significant differences between the 19th century lower and middle layers. Moreover, the listed main prey for Siuren I are also typical for principally all Crimean Middle Paleolithic sites (Vekilova 1971; Kolosov *et al.* 1993; Chabai & Monigal 1999).

Thus, the only one way remaining to examine the Siuren I Middle Paleolithic/Crimean Micoquian Tradition fauna exploitation is to argue that it was based on the same ungulate species hunting by Neandertals that was also typical for the Early Aurignacian of Krems-Dufour type industry *Homo sapiens*. Of course, some preferences in animal species hunting are quite possible between these different inhabitants of the Siuren I rock-shelter, but with the available data, this cannot be evaluated further.

Characteristics of human occupations and their variability within the entire occupational event

The Middle Paleolithic/Crimean Micoquian Tradition Neandertals periodically and only partially occupied the Siuren I rock-shelter across an area of about 100 sq. meters as established by the 1920s and the 1990s excavations, and did not expand their activity and living areas into the rock-shelter's central inner part investigated by Merejkowski in 1879-1880. The entire occupation event is seen through the presence of Middle Paleolithic flint artifacts in four stratigraphically distinct archaeological hearth/ashy levels observed in the 1990s Units H and G and in three hearth/ashy levels of the 1920s Lower layer. Artifact numbers differ for each occupation episode, clearly evidenced by the 1990s excavation data where level Gc1-Gc2 contained almost 50% of all identified Middle Paleolithic flints. At the same time, the numerical artifact differences between several occupation episodes are within the same range of industrial composition and features with the general emphasis on tool thinning and rejuvenation. Thus, the Siuren I Middle Paleolithic/Crimean Micoquian Tradition Neandertal occupations were characteristic of highly "ephemeral stations" - very brief visits associated with a specific activity.

Proposed chronology

The Units H and G accepted AMS dates on ungulate bone samples from Oxford and Beta labs are grouped around 31 and 28,000 BP. None of the paleoenvironmental data (fauna, microfauna and mollusks) show the presence of any specific cold-loving species from the 1990s excavations, pointing to rather temperate climatic conditions for the 1990s Units H and G (Lopez Bayon 1998; see Patou-Mathis, Markova, Mikhailesku this volume). Given this, it is possible to geochronologically date the Siuren I Middle Paleolithic/Crimean Micoquian Tradition Neandertals occupation event to either the Arcy Interstadial (31500-30000 BP) or the Maisières Interstadial (29300-28000 BP) of the Last (Würm) Glacial. We are inclined to support the former (Arcy) Interstadial period. In our opinion, the presence of the Early Aurignacian of Krems-Dufour type industry, unknown in Europe after the post-Arcy period, in these cultural bearing sediments, as well as the certain disappearance of Middle Paleolithic Neandertals after the post-Arcy period, additionally may attest to the proposed Arcy Interstadial for the Siuren I geochronological position.

Position of the industry within the Crimean Micoquian Tradition

According to the geochronological considerations, the Siuren I Middle Paleolithic industry is a very late one within the Crimean Micoquian. Moreover, the presence of many "déjeté/off-axis", trapezoidal, and triangular and leaf-shaped unifacial and bifacial points and scrapers, as well as their thinning and rejuvenation processes, allows us to situate the Siuren I Micoquian industrial type affinity within the Crimean Micoquian Tradition. It has definite techno-typological features of the Kiik-Koba type industry where, among sites of Crimean Micoquian Tradition of this particular type, the Buran-Kaya-III, layer B find complex was also dated by Pettitt (1998) by AMS to 29-28 000 BP. So, the long claimed statement of the exclusive presence of sites with Kiik-Koba type industry only in Eastern Crimea (e.g., Gladilin 1976, 1985; Kolosov 1986; Kolosov *et al.* 1993; Stepanchuk 1991; Chabai *et al.* 1995; Chabai & Marks 1998) does not correspond to current data and should be reconsidered (see Demidenko 2004). Thus, the Siuren I rock-shelter should also be regarded as the site with Kiik-Koba type industry of the Crimean Micoquian Tradition in Western Crimea. Further, the Siuren I Kiik-Koba type industry "ephemeral stations" data generally correspond to the Micoquian (Ak-Kaya type industry) "ephemeral stations" of Kabazi-II, Unit II and Sary-Kaya in the Crimea through the following features: "... a high percentage of tools, an absence or rarity of cores, ... extremely low artifact densities, ... blank to core and tool to core ratios are extremely high, ... limited on-site production and the high incidence of tool importation, ... production of unifacial tools on bifacial thinning/rejuvenation flakes" and fireplaces absence (Chabai & Marks 1998:362-363 and tabl. 15-2 on p. 364). At the same time, the Micoquian open-air "ephemeral stations" at Kabazi-II and Sary-Kaya are characterized mainly by "...butchering of megafauna" (Chabai & Marks 1998:363), while the same main economic activity cannot be claimed for the Siuren I Kiik-Koba type industry rock-shelter "ephemeral stations". There was quite probably a specific and limited economic activity performed by Neandertals at Siuren I that may be indicated by the presence of two typical resharpening flakes from the tips of unifacial and bifacial convergent (asymmetric and symmetric) tools, one "Janus/Kombewa" retouch chip from basal ventral thinning of a tool out of a total of 20 tools from the 1990s excavations, as well as three resharpening chips from unifacial convergent (asymmetric) tools' tips in the 1920s collection, which are unknown in the Micoquian open-air "ephemeral stations" but instead known from some Crimean Micoquian "short-term camps" (e.g., Starosele, level 1 and Kabazi-V) and some "unique camps" (e.g., Buran-Kaya-III, layer B of Kiik-Koba type industry), although with a much higher tool frequency (Demidenko 2003, 2004). Adding to these specific rejuvenation pieces the overall abundance of retouch flakes in the Siuren I Kiik-Koba type industry find complex, we may indeed highly speculate on Neandertal economic activity at the rock-shelter.

All in all, the Siuren I Middle Paleolithic/Crimean Micoquian Tradition Kiik-Koba type industry of the 1920s Lower layer/1990s Units H and G has specific "ephemeral station" features and is dated to ca. 30000 BP, assumed to be situated geochronologically to the Arcy Interstadial of the Last (Würm) Glacial period, placing it into a very late expansion of the Crimean Micoquian.

The Upper Paleolithic/Early Aurignacian of Krems-Dufour type industry of the 1990s Units H and G/ 1920s Lower layer

Finds of this occupation event have already been thoroughly described and analyzed in several chapters of this volume, enabling a real summary to be presented here.

Assemblages: Composition, variability by archaeological level and industrial features

This industry is represented by about 15000 artifacts (including about 80 core-like pieces and about 800 tools) from the 1920s

Lower layer and 5348 pieces (including 27 core-like pieces and 425 tools) from the 1990s Units H and G. Data on the 1879-1880 excavations are not used here because of their incomplete characteristics. Thus, in a total investigated areas of about 100 sq. meters, nearly 21000 lithic artifacts were recovered.

For the most detailed understanding of the internal composition of the assemblages, the 1920s Lower layer and the 1990s level Ga should be excluded. It has been shown that the former does not provide exact numbers for many artifact categories and the latter is too poor in finds and, for example, lacks such important artifact categories as core-like pieces and waste from production and rejuvenation of tools. On the other hand, the 1990s assemblages from Unit H and three hearth/ashy levels of Unit G (Gd, Gc1-Gc2 and Gb1-Gb2), treated by the same artifact classification method and representing all artifact categories, are the most appropriate for clarification of their composition and variability.

Representation of the main artifact categories in these four assemblages is shown in the following percentage ranges: core-like pieces - 0.5-0.6%, core maintenance products - 2.2-2.9%, debitage - 27.8-39.8%, tools - 5.4-9.8%, waste from production and rejuvenation of tools - 0.2-1.9%, debris - 45.1-63.4%. These show that core-like pieces and core maintenance products are of similar frequency; waste from production and rejuvenation of tools is nearly identical for each assemblage; debitage, tools and debris indices indicate a broader range of variability in representation. The notable thing, however, is that individual indices within the percentage intervals for the latter three artifact categories show successive patterns of change throughout the archaeological sequence from the lower level (Unit H) to the upper level (Gb1-Gb2). Debitage is characterized by a decreasing pattern: 39.8% for Unit H, 35.5% for level Gd, 35.0% for level Gc1-Gc2 and 27.8% for level Gb1-Gb2. Tools also show a decreasing trend: 9.8% for Unit H, 9.0% for level Gd, 8.5% for level Gc1-Gc2 and 5.4% for level Gb1-Gb2. Debris (chips, uncharacteristic debitage pieces and chunks), on the other hand, show an increasing pattern: 45.1% for Unit H, 52.0% for level Gd, 52.3% for level Gc1-Gc2 and 63.4% for level Gb1-Gb2. These changing trends through the archaeological sequence can be interpreted as follows. Lower general productivity of primary flaking processes for blanks is associated with an increased emphasis on secondary retouching processes as evidenced by the increase in the percentage of chips in the sequence - 36.6% for Unit H, 37.6% for level Gd, 38.9% for level Gc1-Gc2 and 52.3% for level Gb1-Gb2. Matching these chip data with a decrease in tools, we can infer the exportation of some finished and rejuvenated tools from the site. A gradual increase in microblades through the sequence can also be observed (for debitage *sensu stricto* - 10.1% for Unit H, 13.0% for level Gd, 13.5% for level Gc1-Gc2, 21.8% for level Gb1-Gb2 and for debitage *sensu lato*, including tools and core maintenance products - 15.1% for Unit H, 19.0% for level Gd, 18.6% for level Gc1-Gc2, 24.6% for level Gb1-Gb2) seem to further confirm these interpretations since microblade production was mainly technologically connected to the reduction of intensive bladelet cores and carinated pieces that also produces more chips.

Typologically, the most valuable artifact categories (core-like pieces and tools), taking into account their low frequency, some unclear core fragments and from 18.2% to 28.4% of non-indicative tools such as notches ("neutral tool types"), retouched pieces and unidentifiable tool fragments in these four tool-kits, could only be structured and compared through the presence/absence of some of the categories and types. On the level of core analysis, it can be said that the generalized presence of bladelet cores in each of the four assemblages is clear; bladelet "carinated" cores are missing only in level Gb1-Gb2 assemblage, while they are present in the other three levels. This difference of the level Gb1-Gb2 should not be taken as very significiant because a carinated end-scraper and a thick shouldered end-scraper are noted in this level, and these and other carinated and thick nosed end-scrapers are known in the other three levels. Recall that, based on the classification system, all of these core and end-scraper types of "carinated pieces" have about the same techno-typological value, in general showing the range of variability in "carinated reduction" in each assemblage. On the level of tool analysis, it can be said that the main tool categories (end-scrapers, burins, retouched blades, "non-geometric microliths") and their particular types are present in each of the four tool-kits. Four other tool categories show a varying presence in these tool-kits. Truncations are present in Unit H, levels Gd and Gc1-Gc2 but absent in level Gb1-Gb2. Aurignacian-like retouched blades are noted only in level Gc1-Gc2 with a single item and almost the same relates to scaled tools with two found in this level, although a unique composite tool (a scaled tool/burin on a concave truncation) of level Gb1-Gb2 should also be noted. Two additional composite tools are again characteristic only for level Gc1-Gc2. The complete absence of truncations, Aurignacian-like retouched blades and the partial absence of composite and scaled tools in Unit H, levels Gd and Gb1-Gb2 may be quite easily explained. First, these tool categories are in total represented by either a small number or just single pieces (e.g., Aurignacian-like retouched blades) in both the 1920s Lower layer and the 1990s Units H and G. Second, level Gc1-Gc2 contains 48.4% of all tools for the four assemblages and the occurrence of these tool categories there is likely due to the better chance of representation there.

Thus, these rather detailed analyses of the composition and variability of the 1990s assemblages in four levels lead to two conclusions. The first is that in grouping together all available data on the 1920s Lower layer and the 1990s Units H and G assemblages, we observe a quite homogeneous Early Aurignacian of Krems-Dufour type industry. The second consists in some changing (developmental?) trends within this homogeneous industry which are visible in changes in percentages of artifact categories, the increased role of microblade production and in the representation of some tool types at the top of this archaeological sequence – the presence of an atypical carinated end-scraper with non-lamellar retouch, a unilateral/flake end-scraper and all dihedral burins (*sic*!) only in levels Gb1-Gb2 and Ga during the 1990s excavations.

Now let us briefly take a look at the general characteristics of these assemblages.

Technology

Primary flaking processes were mainly directed toward bladelet *sensu lato* production (40.3-51.1% of bladelets and microblades

together in debitage *sensu lato* (including tools and core maintenance products) from bladelet cores among which the most characteristic are Aurignacian carinated types.

Typology

Typological structures of the 1920s Lower layer and the 1990s Units H and G tool-kits correspond to the observed technological characteristics of the assemblages. "Non-geometric microliths" compose about 40% of all tools in the 1920s Lower layer and about 60% of all tools in the 1990s Units H and G. In our "sample-like" assemblages of 1990s Unit H and levels Gd, Gc1-Gc2 and Gb1-Gb2, "non-geometric microliths" constitute from 58.9% to 67.6% of all tools (excluding, of course, Middle Paleolithic types from the calculation). The most characteristic "non-geometric microlith" types are Aurignacian with flat and semi-steep micro-scalar and/or micro-stepped retouch - numerous " Dufour bladelets" (bladelets and microblades) with bilateral alternate retouch - 63.2-72.0% in Unit H and levels Gd, Gc1-Gc2, Gb1-Gb2 of the 1990s excavations and some "Krems points" with bilateral alternate and bilateral dorsal retouch - 7.0% in Unit H and 2.5% in level Gc1-Gc2. Indicative Upper Paleolithic tool types are represented by the following categories in decreasing order: burins with angle and on truncation types dominant and dihedral type subordinate, occurring notably at the top of this archaeological sequence during the 1990s excavations (levels Gb1-Gb2 and Ga), as well as the absence of carinated types in Units H and G and possibly a very minor presence in the 1920s Lower layer; end-scrapers with rare but typical carinated and thick/flat shouldered/nosed types and dominance of simple flat types mostly made on unretouched blades; scaled tools; truncations; retouched blades and only a very few pieces with "Aurignacian-like heavy retouch"; perforators.

Bone tools and non-utilitarian objects

The Siuren I Early Aurignacian is also characterized by distinct sets of bone tools and shell beads in the 1920s Lower layer and the 1990s Units H and G find complexes. The bone tools from the 1990s excavations (see Akhmetgaleeva this volume) are flat points with pointed tips not clearly isolated and a single shouldered awl with a long sting. The shell beads (see Mikhailesku this volume) are as follows: fresh water river mollusk – *Theodoxus transversalis*, terrestrial snails – *Helix lucorum taurica* and *Helicella dejecta*, marine mollusk – *Apporhais pes pelicani*. It is worth stressing a unique feature for the presence of *Aporrhais pes pelicani* in the Siuren I Early Aurignacian. This Black Sea marine mollusk was already a fossil for the period when Aurignacian groups settled at Siuren I. At the same time, a detailed shell bead analysis has recently been done for Riparo Moshi in Italy by Mary Stiner (1999) and *Aporrhais pes pelicani* species was only present in layer G associated with a kind of Proto-Aurignacian industry and not in any of the other numerous archeological levels there. Moreover, *Aporrhais pes pelicani* was a living species for layer G Aurignacian inhabitants at Riparo Mochi. The latter "shell bead" once again confirms that the noted Siuren I non-lithic artifacts are quite common for the European Early Aurignacian of Krems-Dufour type/Proto-Aurignacian which are also characterized by the complete absence of split-based bone points so typical of the Western and Central European Aurignacian I assemblages.

Fauna data as indicators of hunting activity and use of its results

The 1920s Lower layer and the 1990s Units H and G fauna data (Vekilova 1957, 1971; Lopez Bayon 1998; Patou-Mathis this volume) have already been discussed in relation to hunting activity during the Middle Paleolithic/Kiik-Koba type industry of the Crimean Micoquian Tradition occupation. The conclusion that hunting of the same main ungulate species (*Saiga tatarica, Bos* sp., *Equus* sp., *Cervus megaceros, Cervus elaphus*) by the Siuren I Upper Paleolithic/Early Aurignacian of Krems-Dufour type *Homo sapiens* remains the most probable. It can only be added that, aside from being food sources, animal bones were also used by these modern *Homo sapiens* for intentional bone tool production. There is, however, one more very special fauna subject for the 1920s Lower layer data that can also be connected to the Siuren I Early Aurignacian subsistence strategy – the (unusual for Crimean Middle Paleolithic) presence of hare (*Lepus timidus*), fish – sea salmon (*Salmo trutta labrax*) and river trout (*Salmo trutta subsp. (fario)?*), and some birds – *Lagopus lagopus*, *Perdix perdix* and *Tetrao tetrix* (see Vekilova 1957: tabl. 2, 4-5 on p. 254-255, 257). The latter species can be associated with the Early Aurignacian.

Characteristics of human occupations and their variability within the whole occupational event

The Upper Paleolithic/Early Aurignacian of Krems-Dufour type *Homo sapiens* periodically occupied the entire currently known area of the Siuren I rock-shelter - about 160 sq. meters in total. The entire occupation event is evidenced by the presence of Early Aurignacian artifacts in four stratigraphically distinct archaeological hearth/ashy levels from the 1990s Units H and G and in three hearth/ashy levels in the 1920s Lower layer. These 3-4 levels (occupation episodes) have different artifact counts. The best evidence is that 43.2% of all finds from the 1990s Units H and G (including level Ga) come from level Gc1-Gc2 alone. At the same time, it can be stated that these 3-4 archaeological levels have very similar occupation characteristics. First, each level contains several usually well-separated hearth/fireplaces and/or ashy clusters. Artifact density ranges from low to medium (with no debris) per 1 sq. meter on average for the 1990s Units H and G - 30.8-38.3 pieces for Unit H, levels Gd and Gb1-Gb2 and 91.9 pieces for level Gc1-Gc2. Flint density is about three times higher in level Gc1-Gc2 in comparison to the other three levels in Units H and G, which may be explained either by more intensive and longer duration of occupation for this archaeological level or by assuming that this level contained the remains of more than one (2-3?) visits to the rock-shelter. Data are not available to select one or the other of these hypotheses; both could explain the relative artifact density for level Gc1-Gc2 in the Early Aurignacian archaeological sequence. Data on flint exploitation and main industrial features of assemblages are also similar in the four levels of the 1990s Units H and G. In total, these data point to "ephemeral" or "short-term" occupations. We inclined to support the latter choice - "short-term" camps - due to the presence of hearths/

fireplaces and/or ashy clusters, bone tools and production of non-utilitarian objects (shell beads). The complete cycles of primary and secondary flint treatment processes typical of these levels additionally strengthens this choice - "intensive short-term camps" - and, at the same time, do not seem to evidence any specialized economic activity but rather all-round economic activity taking place at the rock-shelter during the short length of each visit.

Proposed chronology

As discussed and proposed for the Middle Paleolithic/Crimean Micoquian Tradition Neandertals occupation, we also propose that the Siuren I Early Aurignacian of Krems-Dufour type *Homo sapiens* occupation might be dated geochronologically to the Arcy Interstadial of the Last (Würm) Glacial, ca. about 30 kyr BP.

Position of the industry within the Crimean Upper Paleolithic

In terms of present knowledge about the Crimean Upper Paleolithic, the Siuren I Early Aurignacian of Krems-Dufour type industry fails to fit into any of the previously defined local Upper Paleolithic industries on the peninsula. On the other hand, it is connected to many European complexes of the Early Aurignacian of Krems-Dufour type industry/Aurignacian 0/ Proto-Aurignacian, as discussed in the previous chapter.

The Upper Paleolithic/Late Aurignacian of Krems-Dufour type industry of the 1990s Unit F/ 1920s Middle layer

As for the Siuren I Early Aurignacian, data on the 1920s Middle layer and the 1990s Unit F finds and their comparisons in this volume for the Late Aurignacian industry are also quite sufficient for summarizing its representation.

Assemblages: Composition, variability by archaeological level and industrial features

The total assemblage includes about 5632 pieces (including 51 core like-pieces and 189 tools) from the 1920s Middle layer and 7575 pieces (including 23 core-like pieces and 182 tools) from the 1990s Unit F. Merejkowski's and Vekilova's data on the 1879-1880 excavations will not be used here as their incomplete characteristics do not provide enough information; they show, however, that finds associated with this industry were also present in the rock-shelter's inner central part. Using only data from the 1920s and the 1990s excavations, we have about 13200 lithics from an excavated area totalling about 110 sq. meters.

Compositions and variability of the assemblages are not easy to discuss in much detail, however. First, the 1920s Middle layer is known to us as a single assemblage with no subdivision into several assemblages related to more than one (at least, two) archaeological level. Second, due to lack of systematic sieving in the 1920s, frequencies of chips and microblades/bladelets are inaccurate. Third, relating to the 1990s Unit F, out of four recognized archaeological levels and assemblages, level Fb1-Fb2 contains 6900 artifacts or 91.08% of all Unit F finds. Thus, the 1920s Middle layer and the 1990s Unit F assemblages can only be discussed by presenting the main features of the industry and then the presence/absence of characteristic techno-typologically core and tool types, followed by an attempt to trace its variability throughout the archaeological sequence.

Technology

Primary flaking processes were based on reduction of both bladelet "regular" and Aurignacian "carinated" (mainly single-platform) cores with plain acute striking platforms with edge abrasion and "carinated tools" (end-scrapers and notably burins), resulting in pronounced microblade production - 50.3% in level Fb1-Fb2 and 45.7% of all Unit F debitage *sensu lato* (including tool blanks and core maintenance products).

Typology

Tool-kits for this industry are notable for the presence of the following Aurignacian types among "Indicative Tool Types": carinated and flat/thick shouldered/nosed end-scrapers; and carinated burins, including some busked burins. The prevalence of dihedral burins over angle and on truncation burins is clear and is in accordance with the occurrence of serial carinated burins. A few perforators and truncations are also present, while scaled tools and retouched blades so typical of the Lower layer/Units H and G are completely absent. "Non-geometric microliths" comprise 42.3% of the 1990s Unit F tools and are dominated by Aurignacian "Dufour bladelets" with lateral ventral retouch and "pseudo-Dufour bladelets" with lateral dorsal retouch, both formed by fine marginal retouch and made on microblades with "off-axis" and even dejete removal directions with twisted general profile.

Composition and variability of the assemblages

As we do not have precise data for the 1920s Middle layer debitage pieces - most are broken and "masked" under Vekilova's category of "chunks and flint fragments" which number about 5000 pieces, we can only use the 1990s Unit F assemblages for this analysis.

Despite striking differences in numerical representation of lithic artifacts for each level of Unit F (Fc - 63 pieces; Fa3 - 407 pieces; Fa1-Fa2 - 205 pieces; Fb1-Fb2 - 6900 pieces), there are some obvious similarities in relative frequencies of the main artifact categories: core-like pieces – 0-0.5%; core maintenance products - 2.3-7.9%; debitage - 27.3-57.2%; tools - 2.2-6.3%; waste from production and rejuvenation of tools – 0-1.0%; debris - 28.6-67.2%. Immediately notable is significant variation in core maintenance products in each assemblage that renders the absence of core-like pieces in level Fc unimportant. Next, tools and waste from production and rejuvenation of tools have internally similar indices and again the absence of the latter category in level Fc is replaced by 6.3% of tools (4 pieces) in that level. Thus, the only real differences are related to debitage and debris frequencies which are correlated. The lowest percentage of debitage (27.3%) for level Fb1-Fb2 corresponds to the highest percentage of debris (67.2%) for that level. On the other

hand, the highest percentage of debitage (57.2%) for level Fc corresponds to the lowest percentage of debris (28.6%). Taking into consideration these data and the small size of the area for Unit F (12 sq. meters) excavated in the 1990s, it is possible to argue that the numerically insignificant assemblages of levels Fc, Fa3 and Fa1-Fa2 represent small fractions and/or peripheral sections with non-intensive primary and secondary flint treatment processes of three Late Aurignacian occupation episodes, while the level Fb1-Fb2 assemblage attests to very intensive all-round primary and secondary flint treatment processes by Late Aurignacian humans.

Interestingly, these differences in assemblage composition do not reflect any techno-typological changing trends in this part of the Siuren I archaeological sequence. Both the 1920s Middle layer and the 1990s Unit F assemblages have the same characteristic core and tool types. A closer look at the four Unit F assemblages again reveals similar types. Different Aurignacian bladelet "carinated" cores occur in level Fb1-Fb2 (7 of the 20 core-like pieces) and level Fa3 (both core-like pieces are of such types) and they are absent in level Fa1-Fa2 where the single core is a flake/bladelet multiplatform one which definitely underwent intensive multiple reduction phases of possibly any kind, including "carinated". Both Aurignacian "Indicative Tool Types" and "non-geometric microliths" are also identified in each level with no any particular changes in occurrence. Thus, from the basic techno-typological positions of the four Unit F assemblages, we have a quite uniform Late Aurignacian of Krems-Dufour type industry. Accordingly, the variability in representation of the different artifact categories can be viewed as the result of different degrees of intensity of human occupation at the rock-shelter.

Bone pieces and non-utilitarian objects

By these artifact types, the Siuren I Late Aurignacian 1920s Middle layer/1990s Unit F complex is also very different from the site's Early Aurignacian, as is the case with lithic artifact types. Bone pieces (see Akmetgaleeva this volume) include points with circular sections, some bone debitage pieces and a single broken polar fox tooth pendant in which a hole was first drilled from both sides, followed by an attempt to chisel through it, causing the pendant to break. Shell beads (see Mikhailesku this volume) include one marine mollusk species (*Gibbula maga albida*) and three freshwater river mollusk species (*Theodoxus fluviatilis*, *Theodoxus transversalis* and *Lithoglyphus naticoides*).

Fauna data as indicators of hunting activity and use of its results

The 1920s Middle layer and the 1990s Unit F fauna data (Vekilova 1957, 1971; Lopez Bayon 1998; Patou-Mathis this volume) are consistent in showing the following main hunting preferences of the Siuren I Late Aurignacian communities. *Saiga tatarica* was the main species hunted, while *Cervus elaphus* was much less representative but still recognized by Lopez Bayon as the focus of specialized hunting. Other species (*Equus* sp., *Bos* sp.) were probably the focus of more opportunistic hunting. The high level of fragmentation for many animal bones in level Fb1-Fb2 again confirms the lithic data regarding the intensity of human occupation at this level. Also, as has been suggested for the Siuren I Early Aurignacian occupations, the Late Aurignacian occupations of the 1920s Middle layer are known by the presence of hare (*Lepus timidus*), and the same bird species – *Lagopus lagopus*, *Perdix perdix* and *Tetrao tetrix*, with no occurrence of any fish, however (see Vekilova 1957: tabl. 2, 4-5 on p. 254-255, 257). Thus, the two two industrially different Aurignacian occupations at Siuren I show that Crimean Early Upper Paleolithic human communities (presumably *Homo sapiens*) were exploiting a wider range of resources, in addition to the same ungulates that the Neandertals hunted.

Characteristics of human occupations and their variability within the whole occupational event

The Upper Paleolithic/Late Aurignacian of Krems-Dufour type industry *Homo sapiens* groups periodically and certainly partially occupied the Siuren I rock-shelter. The greatest density of lithic and bone artifacts, and fauna finds of the 1920s Middle layer in the rock-shelter's central part around its drip-line area (sq. 12-Ж, З, 16-Е, Ж, 16-И, 15-Ж) is in accordance with data from the 1990s Unit F investigations (sq. 10, 11-Ж, З) and, therefore, the view expressed by Vekilova on this particular area as «a center of human occupation for the Middle layer» (1957:306) also finds further confirmation in our new investigations. Other areas of the rock-shelter with the Middle layer present are of definite peripheral nature (Vekilova 1957:304-306) with fewer finds. At the same time, some of Vekilova's data on the Middle layer and data on archaeological sequence of Unit F allow us to make some more definite determination regarding human occupations of the Siuren I central area around the drip-line zone. Vekilova notes that "... almost on each square was defined a hearth/fireplace. There were two hearth levels in some squares. The most intensive hearth levels were traced on sq. 15-E and 12-Ж where they were up to 25 cm thick» (1957:306). These observations show that at least two archaeological levels were present within the Middle layer and many separate hearth/fireplaces (at different depths?) as well in that area. The 1990s excavations of Unit F revealed a single thick hearth/ashy archaeological level (Fb1-Fb2) and three more levels (Fc, Fa3, Fa1-Fa2) with separate fireplaces (no hearths) and/or ashy clusters. The archaeological and fauna finds for the four levels of Unit F also show that the same kind of economic activity took place during each occupation (level) but with different degrees of intensity. Levels Fc, Fa3 and Fa1-Fa2 have very low artifact densities (with no debris) per 1 sq. meter - from 3.8 pieces in level Fc and 10.9 pieces in level Fa1-Fa2 to 20.3 pieces in level Fa3. Each of these levels with a fireplace and/or ashy clusters can be considered as rather minor remains of probably a single "ephemeral" human occupation. On the other hand, level Fb1-Fb2 has an average density of 188.5 lithic items (with no debris) per 1 sq. meter. Adding to these statistics the very intensive "on-site" primary and secondary flint treatment processes and especially the mass microblade production, the only occurrence of bone tools and non-utilitarian objects in this level for Unit F, nine hearths/fireplaces and ashy clusters, it is clear that level Fb1-Fb2 was a sort of "base camp" for Late Aurignacian groups at Siuren I. Although the structures and spatial distribution of hearths/fireplaces and ashy clusters evidence that they were not all contemporaneous, both very numerous and characteristic

"on-site" flint treatment and fauna exploitation processes actually evidence intensive and quite prolonged features for perhaps several human occupations of level Fb1-Fb2. At the same time, the main numerical difference in techno-typological structures between Unit F "ephemeral stations" and "base camp" assemblages is the rarity of "non-geometric microliths" for the former and their abundance for the latter, which can be explained through different degrees of intensity of flint exploitation due to different patterns in economic activities of Late Aurignacian of Krems-Dufour type industry human groups.

Proposed chronology

Keeping in mind the geochronological considerations and the preference of the Arcy Interstadial (ca. 31500-30000 BP) for the Siuren I 1920s Lower layer/1990s Units H and G Middle Paleolithic/Kiik-Koba type industry of the Crimean Micoquian Tradition and Upper Paleolithic/Early Aurignacian of Krems-Dufour occupations, we should also determine the geochronological position for the 1920s Middle layer/1990s Unit F Late Aurignacian of Krems-Dufour occupation. A series of AMS dates for Unit F levels in the range of 31 – 27,000 BP and paleoenvironmental data (this volume) are identical to Units H and G, making the connection of this Late Aurignacian event to the Arcy Interstadial the more probable. Also, the later Maisières Interstadial (29300-28000 BP) cannot be completely excluded regarding the Late Aurignacian industrial features for the 1920s Middle layer/1990s Unit F assemblages. Thus, at present we cannot make a synonymous geochronological determination here, accepting the equal possibility for these two interstadials as likely candidates for the time span corresponding to the Late Aurignacian occupation at Siuren I.

Position of the industry within the Crimean Upper Paleolithic

Like the Siuren I Early Aurignacian of Krems-Dufour type industry, this Late Aurignacian of Krems-Dufour type industry does not have any similar industrial manifestations in the Crimea, and only the pan-European comparisons presented earlier contribut to understanding its position within the European Aurignacian.

The Upper Paleolithic/Late Aurignacian of Krems-Dufour type industry of the 1990s Unit E/Lowest Finds of the 1920s Upper layer

Data on this occupation are quite limited. Therefore, the summary analysis will be done with no special headings for "step-by-step" detailed descriptions as done above for the three Siuren I basal occupations and their industries.

Stratigraphically, Unit E occupies the uppermost part in the archaeological sequence of the Siuren I 1920s Middle layer and 1990s Unit F. Along with this, it was considered by us to be separate from the Unit F archaeological sequence due to the presence of clear and thick culturally sterile deposits between them. Moreover, some of the Aurignacian tool types of the presumably stratigraphically lowermost finds in the 1920s Upper layer can also be connected to 1990s Unit E.

Only lithic artifacts of both the 1920s and the 1990s excavations are related to this occupation; seven flints are known for Unit E. Despite such scarcity, two pieces are very indicative: a bladelet single-platform "advanced carinated" core and a bladelet narrow flaked core/"carinated burin". Similar pieces - a thick shouldered end-scraper and a bladelet narrow flaked core/"carinated burin" - are also represented among the 1920s Upper layer finds. All three very characteristic Aurignacian core and tool types have direct analogies in Unit F assemblages that, from an industrial techno-typological point of view, allow us to consider this industry as belonging to the Siuren I Late Aurignacian of Krems-Dufour type industry of the 1920s Middle layer/ 1990s Unit F, and this fourth human occupation event as the most recent Aurignacian one at Siuren I. The absence of "non-geometric microliths" among the 1990s Unit E finds may be explained by the very limited and minimal flint treatment processes carried out during this "vey ephemeral" (less than 1 artifact per 1 sq. meter on average) visit(s) to the rock-shelter. At the same time, the absence of any indications of industrial changes through time from the assemblages from Unit F to Unit E suggests that the chronological gap between these two Late Aurignacian occupation events was very short, allowing us to consider both as different manifestations of the same Late Aurignacian of Krems-Dufour type industry at Siuren I. The presence of just a few unidentifiable bone fragments in Unit E give no data regarding hunting activity and fauna exploitation during this Late Aurignacian occupation.

The Upper Paleolithic/Gravettian industry of the 1990s Unit D/3rd horizon of the 1920s Upper layer

Like the above final Late Aurignacian occupation, the Gravettian occupation at Siuren I rock-shelter does not "boast" very detailed data. Its summary is thus also quite limited.

Only lithics are again known for this occupation. The 1990s Unit D assemblage is composed of just eight artifacts although two are quite indicative: a blade and a bladelet double-platform bidirectional cores with elongated proportions (length - 6.6-6.5 cm and width - 5.2-2.9 cm). The find concentration in the rock-shelter's central area around the drip-line zone (sq. 15, 16-Ж) with a single hearth/ashy lens in the 1920s 3rd horizon of the Upper layer also has two similar cores - blade/bladelet double-platform bidirectional ones again with elongated proportions (length - 7.3-6.8 cm and width - 3.6-2.8 cm). Such cores are completely unknown in both stratigraphically underlying Aurignacian assemblages and stratigraphically overlying Epi-Gravettian and «Azilian»/Shan-Koba assemblages. To these cores are techno-typologically connected a series of backed pieces from the 1920s Upper layer finds with bidirectional scar pattern and/or elongated proportions among which the most indicative items are a Gravettian point with truncated base, three shouldered pieces and «a microsaw». These tools are again different from the numerous (more than 100) «simple» backed pieces in the 1920s Upper layer which we consider as belonging to the site's Epi-Gravettian industry; backed pieces with thick abrupt retouch are absent from the Siuren I Aurignacian assemblages.

Thus, the Siuren I Gravettian industry is based on, from a technological point of view, reduction of rather large and elongated blade/bladelet double-platform bidirectional cores and, from a typological point of view, on production of backed pieces. Such techno-typological industrial features are typical for European Gravettian industries.

Chronologically, we propose to view the Siuren I Gravettian as dated between 27000-20000 BP. The lower chronological limit is suggested on the basis of the assumed maximum upper time limit of 27000 years BP for the Aurignacian at the site, whereas the upper chronological border is typical of the European Gravettian *sensu stricto*. At the same time, the presence of shouldered pieces and "a microsaw" in the Siuren I Gravettian further clarifies this chronology, making its framework much narrower – ca. 23000-20000 years BP since these tool types are mainly restricted to the Central and Eastern European Late Gravettian during this time frame.

Taking into consideration the rare finds from a single assumed archaeological level distributed in a limited central part of the rock-shelter, we suggest that the Gravettian occupation is either an "ephemeral station" or a "short-term camp". A decisive choice is hard to make, although the presence of a hearth/ashy lens in this archaeological level may favor a "short-term camp".

The Upper Paleolithic/Epi-Gravettian industry of 1990s Unit A and some finds in Humus Deposits/2nd horizon of the 1920s Upper layer

This occupation event is reconstructed by us on the basis of rather poor and, importantly, non-indicative finds in 1990s Unit A, several non-*in situ* backed pieces from the 1990s humus deposits and analysis of most of the numerous and techno-typologically clear finds of the 1920s Upper layer's 2nd horizon.

Uppermost in the 1990s excavations Siuren I archaeological sequence, the Unit A Upper Paleolithic assemblage is composed of 82 flint items but, unfortunately, neither cores and debitage nor tools exhibit any indicative types or sorts of *fossiles directeurs* that would enable industrial attribution within Upper Paleolithic technocomplexes. In this situation, we can only suggest their correspondance to most finds in the 1920s Upper layer's 2nd horizon. At the same time, a series of five backed bladelets and microblades (including three pieces with "projectile damage") from the 1990s non-*in situ* humus deposits quite resemble many backed pieces in the 1920s Upper layer and likely form an integral part of the latter Epi-Gravettian industry. So, the 1920s Upper layer's 2nd horizon data are the main source of information for the Siuren I Epi-Gravettian occupation and its industry.

The 1920s Upper layer's 2nd horizon is found in both western and central areas of the rock-shelter. The central area is marked by the presence of no less than three archaeological levels within the 2nd horizon and each of these levels was accompanied by a hearth/ashy lens in sq. 13-E, Д and 15-E, Ж. No less than 3000 flint artifacts are related to the Epi-Gravettian industry. Technologically, this is based on intensive reduction of bladelet single-platform and double-platform cores with shortened metric proportions (mainly 2.9-3.9 cm long) in about equal percentages. Typologically, end-scrapers and burins seem to be represented by less than two dozen examples each, whereas backed bladelets and microblades with thick abrupt retouch are much more common - more than 100 items, including a few «microgravettes» and «a rectangular» piece.

Partial and differing representation of the Epi-Gravettian finds throughout the rock-shelter's investigated area in which only a limited central area contains a multi-level archaeological sequence with three hearth/ashy lenses strongly suggests that the Siuren I Epi-Gravettian occupation event reflects periodic occupation episodes in some parts of the rock-shelter ranging from "ephemeral stations" to "short-term camps".

Industrially, the Siuren I Epi-Gravettian industry should be analyzed together with other Crimean Epi-Gravettian complexes from Adji-Koba and Buran-Kaya-III, but at the moment none of these three assemblages has been classified in detail and, therefore, it is only possible here to argue for the general similarity between these Crimean Epi-Gravettian complexes. Taking into consideration the common predominance of "simple" backed bladelets and microblades in these tool-kits, we could suggest generic links between the Crimean Epi-Gravettian and the Central European Epi-Gravettian and, specifically with its two provinces - the Middle Danube Basin Epi-Gravettian dated to ca. 20000-18000 BP (Hromada & Kozlowski 1995) and the Romanian East Carpathian Epi-Gravettian area dated to ca. 18000-15000 BP (Chirica 1989). With no definite absolute dates yet available for the Crimean Epi-Gravettian complexes, we have no other choice than to accept very wide chronological ranges for them between ca. 20000-15 000 BP.

The Final Paleolithic/"Azilian" Shan-Koba type industry of the 1920s Upper layer's uppermost finds

This occupation is defined only through analysis of the available published and unpublished data from the 1920s Upper layer. There is no data on the "Azilian" Shan-Koba type industry from the 1990s excavations, given that any related finds were not found in the rock-shelter's central area where our new limited excavation block was located.

Two distinct, spatially discontinuous "Azilian" Shan-Koba type industry find spots have been distinguished at Siuren I - the eastern and the western ones. Taking into account their "independence" one from another, they deserve separate analyses.

The eastern find spot is restricted to sq. 24-E, Ж with a total area of 8 sq. meters (4 x 2 m). Overall quantity of finds is less than 100 flints, including two typical Shan-Koba segments and eight shortened end-scrapers. No mixture with Upper Paleolithic finds (Gravettian *sensu lato* artifacts of the 1920s Upper layer) is noted for this "Azilian" Shan-Koba find spot. The assumption by Bonch-Osmolowski that these finds belong to the Siuren II "Azilian" complex seems to be the most probable and, therefore, their analyses should be conducted together with the Siuren I "Azilian", beyond the scope of this book.

The western find spot is evidenced by the presence of "Azilian" Shan-Koba type industry flint and bone artifacts in sq. 8, 9-B, Г and 10, 11-Г (about 8 sq. m in total) of the 1st and 2nd horizons of the 1920s Upper layer. All «Azilian» indicative types (two flint segments and an unfinished segment/obliquely retouched «Azilian» point, all «bone pieces» - a bone awl, an engraved broken red deer antler, two broken red deer and beaver tooth pendants) were discovered in sq. 8, 9-B, Г near a single hearth («late/Mesolithic», according to both Bonch-Osmolowski and Bibikov). Unfortunately, all these and surely some other «Azilian» finds were then grouped together with stratigraphically lower Epi-Gravettian artifacts by Bonch-Osmolowski into a «uniform» 2nd horizon of the Upper layer collection from the site's western area. Because of this, it is not possible to determine other artifact categories and types for this «Azilian» complex and, therefore, we may only assume the presence of some end-scrapers, burins and debitage pieces with no precise data for them. Thus, the complete artifact composition for the Siuren I western «Azilian» find spot remains unclear and we can only consider this particular very small spot as evidence of a single very short visit to the rock-shelter by «Azilian» people with limited and still unknown economic activity at an «ephemeral station» or «short-term camp».

Long and wide metric proportions of segments on «rough» blanks and the «bone pieces» of the Siuren I western «Azilian» finds spot have direct analogies in the Crimean «Azilian» Early Shan-Koba type industry complexes - e.g., Shan-Koba rock-shelter, layer 6. On the basis of comparison to these «Azilian» complexes, it is quite possible to geochronologically situate the Siuren I western find spot to the Alleröd Interstadial of Final Pleistocene (ca. 11800-10800 BP) as has been proposed for the Shan-Koba rock-shelter, layer 6 (Zaliznyak & Yanevich 1987:11; Bibikov *et al.* 1994:166). In addition, warm-loving fish species (*Rutilus frisii* and *Leuciscus cephalus*) found in the 1920s Upper layer connected by us to the two "Azilian" finds spots further support the proposed Alleröd Interstadial interpretation.

Concluding remarks

The summarized data on the Siuren I archaeological industrial sequence seen through the site's seven human occupation events certainly evidences the great diversity of Paleolithic industries present at the site with respect to both archaeological characteristics and chronology. The time period for the different Paleolithic occupation events at the site ranges chronologically from about 30/28000 BP to about 12/11000 years BP, nearly 20000 years. This is a quite long chronology, starting with the Kiik-Koba type industry of the Crimean Micoquian Tradition at the the very end of Middle Paleolithic and the Early Aurignacian of Krems-Dufour type at the beginning of the Upper Paleolithic to the Final Paleolithic. At the same time, it is not possible to argue that the archaeological sequence at this particular and clearly very important Crimean Paleolithic site reflects local development the seven industries represented. Instead, we see discontinuity in the development of the archaeological sequence of very different Paleolithic complexes representing many separate and discrete visits to the rock-shelter by "independent" human groups with no relations or connections between them with respect to their lithic technological traditions. The only exception can be proposed for the Early and Late Aurignacian of Krems-Dufour type industries here, on the basis of changing trends in assemblages recovered from the 1990s Units H and G toward the presence of tool types that would seem to be characteristic of the 1920s Middle layer/1990s Unit F assemblages. But these industrial changing trends (the appearance of dihedral burins, a carinated atypical end-scraper, a unilateral/flake end-scraper only at the top of the Units H-G sequence in levels Gb1-Gb2 and Ga) are still too minor too argue for real transitional processes that, in conjunction with even the maximum supposed chronological framework for these two Aurignacian complexes (30000-28000 BP), cannot be really used yet for substantiation of local Aurignacian development through time at Siuren I, although these facts should to be kept in mind. Moreover, aside from the Middle Paleolithic occupation, for which the Kiik-Koba type industry is surely very late one within the local Crimean Micoquian Tradition, after the Last Interglacial on the peninsula, all of the other Siuren I six occupation events are evidence of non-local "visitors" in Crimea, arriving there from western and northern territories and, accordingly, archaeologically connected to the Central and Eastern European Aurignacian, Gravettian, Epi-Gravettian and Final Paleolithic industries.

Despite the many new contributions regarding the archaeological context at Siuren I on the basis of the new 1990s excavations, analyses of the new data and of the data from the site's earlier investigations, all aspects of the site's occupations and their industries have not been resolved. Only the first four occupation events (Kiik-Koba type industry of the Crimean Micoquian Tradition, Early and Late Aurignacian of Krems-Dufour type) are more or less well-understood now, although additional AMS dates and pollen analysis would certainly significantly clarify and broaden the dataset. On the other hand, the other three Gravettian, Epi-Gravettian and Final Paleolithic occupations, stratigraphically related to the site's upper cultural deposits, were only briefly described and several hypotheses proposed, without detailed accompanying analyses. To explain these three occupation events, further research is required including new excavations of the upper cultural sediments, although it will be difficult to find an appropriate, even limited, area, for such fieldwork with good preservation of *in situ* deposits, and detailed techno-typological and spatial and stratigraphic distribution analysis of the 1920s Upper layer collection stored in St.-Petersburg (Russia). These studies would specify the techno-typological features of the Siuren I Gravettian, Epi-Gravettian and Final Paleolithic complexes for more valid evaluations of their archaeological positions within the related Central and Eastern European and the Crimean technocomplexes, as well as other characteristics of their occupation events - for example, fauna data which are uncertain for these complexes.

Such disparity in explanation of units usually occurs for archaeological multi-level sites when not all occupation events and associated assemblages are equally understood for objective and subjective reasons. As we have seen, this is also the case at the Siuren I rock-shelter. When more work is done, more work is often additionally needed...