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VIEWS OF THE CRIMEAN MIDDLE PALEOLITHIC: PAST AND PRESENT.

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INTRODUCTION

This paper examines the past and present of Crimean Middle Paleolithic research. As in many parts of the world, Crimean prehistoric research has seen periods of intense activity and periods of little work. Since the 1970s, however, Middl Paleolithic studies have been quite active and, if anything, their intensity is increasing, owing to a new generation of Ukrainian archaeologists and the active encouragement of the Crimean Branch of the Institute of Archaeology, Simforopol. With the development of cooperative projects between Ukrainian and Western scholars, a good deal of new data will soon be forthcoming which must be understood within the context of previous work. While few western publications have dealt in detail with the Crimean Middle Paleolithic (Klein 1965, 1969; Kolosov 1985), there is a long and rich history of research. Issues have been raised and methodologies developed which affect present work, as they will future research. Thus, this paper initially takes an historical approach to put our present work into context.

PRE-WORLD WAR II

Investigations into the Crimean Paleolithic began over 100 years ago. During 1879 and 1880, Konstantin Merejkowsky (1884), then only twenty-five, began a project to document the existence of Paleolithic occupation in the Crimea. He excavated test pits into thirty-four caves and rock shelters, discovering evidence for Paleolithic occupations at the now famous sites of Siuren, Kacha and Volchiy Grot (fig. 1). He also found surface artifacts on Kabazi Mountain; an area still central in ongoing research. The surface materials from Kabazi and those from Volchiy Grot rock shelter were the first evidence for Middle Paleolithic occupation discovered in Russia. The world-known French authority, G. Mortillet (1900), confirmed the Mousterian age of these finds and, in doing so, showed that the Middle Paleolithic, only recently discovered in southwestern France and Spain, was also present in far eastern Europe. In spite of this important discovery, Merejkowsky's work was soon forgotten and there was no significant research into the Crimean Paleolithic for the next four decades (Vekilova 1979).

The second stage of Crimean Middle Paleolithic research is closely linked with the famous Soviet scientist G. Bonch-Osmolowski. Influenced by the ideas and discoveries of western European prehistorians, under whom he had studied, G. Bonch-Osmolowski embarked on Paleolithic research using new methodologies. From 1924 through 1929, his Crimean Paleolithic Expedition tested 220 caves and rock shelters along the Second east/west row of low mountains just north of the main Crimean mountain chain (fig. 1). In only ten however, was there evidence for Paleolithic occupation. Among those, only three contained Middle Paleolithic: Adji-Koba, Kiik-Koba, and Shaitan-Koba, the latter two still of considerable importance. Not surprisingly, these limited finds resulted in the understandable conclusion that the Crimea was less populated during the Paleolithic than was France (Bonch-Osmolowski 1934 : 121).

Although he had a very small Middle Paleolithic site sample, he still saw some evidence for evolutionary development,

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subdividing the materials from the three sites into three stages. The earliest, from Kiik-Koba, lower level, he referred to as "amorphic" because it contained a large number of small, irregular notched and denticulated tools on flakes; the second, from the upper level at Kiik-Koba, he called "Mousterian" because of its plentiful unifacially and bifacially pointed tools, as well as its many sidescrapers and denticulates on flakes; and, the third and most "evolutionarily advanced", from Shitan Koba, he considered "late Mousterian" or "transitional to the Upper Paleolithic" because many of its sidescrapers and pointed tools were made on blanks with blade proportions. In short, Bonch-Osmolowski's view fit into the then current Western European ideas of unilinear evolutionary Paleolithic development.

This strict evolutionary paradigm influenced how Bonch- Osmolowski interpreted the burials and tool kits he found at Kiik-Koba. Committed to the great antiquity for the lower level at Kiik-Koba and, thus, the necessity for only "primitive" tools, Bonch-Osmolowski ignored the presence of some finely made bifacial points (Kolosov, Stepenchuk, and Chabai 1993) and interpreted one Neanderthal burial from the lower level, as coming from the upper level (Gladilin 1979). The adult female and the child, of still unclear provenience, were the first anatomically pre-modern fossils found on the territory of the former USSR.

Using a comparative method based on the proportional occurrences of various tool types in different levels of different sites, Bonch-Osmolowski (1934) defined what he sa as "cultural" variability in the Crimean Middle Paleolithic. Unfortunately, he did not develop this approach and defining industries by their typological variability became central to Soviet Paleolithic studies only after World War II.

POST-WORLD WAR II

It was only during the early 1950s that Crimean Paleolithic research began again with the work of A. Formosov. While still in his 20s and with little excavation experience, he brought some new ideas to his field work which, on the one hand, shifted and improved the survey strategies from those used by Bonch-Osmolowski but, on the other, lowered the high quality of excavations established by Bonch-Osmolowski.

A. Formosov and his assistant A. Schepinsky focused their survey on the lowest and northernmost ridge of the Second row of Crimean mountains. This last mountain row borders the steppe of central and northern Crimea: along it there are abundant flint outscrops, water sources and numerous limestone cliffs with rock shelters. It is also where the rivers which raise on the northern side of the main Crimean mountains finally flow onto the steppe through small, sheltered valleys (fig. 1). Without doubt, Formosov's team knew where Paleolithic sites would be found!

In addition, Formosov believed that many of the rock shelters and caves present during the Paleolithic had collapsed and were buried by subsequent colluviation. Thus, to locate Paleolithic sites one had to find these buried rock shelters by excavations along the steep questa slopes. In fact, the first such possibly buried rock shelter, Backchisarai, had been found in 1940 by D. Krainov (1979).

The shift in survey strategies was successful. Without the massive testing program of Bonch-Osmolowski, between 1952 and 1956 Formosov discovered three important Middle Paleolithic sites: the collapsed and buried rock shelter of Kabazi I (Forsmosov, 1958, 1959) and the two rock shelters of Starosele and Kholodnaya Balka.

Based mainly upon his excavations, in 1954 Formosov suggested a bi-partate division of the Middle Paleolithic of the Crimea and the adjacent Russian plain; one with and one without bifacial tools. The sites of Kiik-Koba, Starosele, and Chokurcha belonged with the bifacial tool group, while Shaitan Koba, Kabazi I, Kholodnaya Balka and Backchisarai fell into the unifacial group. Rather than viewing these two groups as evolutionarily different, he concluded that ". . in the Crimea coexisted different groups of

people, who used different technologies" (Formosov 1954:13)

While Formosov's subdivision of the Crimean Middle Paleolithic was simple to apply to newly found assemblages, it was hardly exhaustive. With F. Bordes' (1950, 1953) development of a rigorous and standardized approach to French Middle Paleolithic studies, as in other parts of Europe, his system profoundly affected Crimean Middle Paleolithic studies. During the mid-1960s, two scholars, both using Bordian systematics, proposed two different classifications of the Crimean Middle Paleolithic. An American scholar, R. Klein (1965, 1969), based on his own study of the materials, subdivided the Crimean Mousterian into two groups; one "resembling" Bordes' Denticulate Mousterian (Kiik-Koba, lower level) and the other "resembling" the Charentian Mousterian (Kiik-Koba, upper level, Starosele, Shaitan-Koba, etc.). The recognition of a Charentian-like Mousterian was based on the high percentage of sidescrapers, often canted and convergent, among the retouched tools and by an absence of Levallois technology (Klein 1965:39, 48, 52-54, 56, 63-64). Klein did note, however, that his classification reflected "more of an academic exercise than a revelation of truth" (Klein 1965:63), and he did not exclude the possibility that additional observations would reveal significant differences among these Charentian-like assemblages.

In fact, more extensive studies were being undertaken during the same time by V. Gladilin (1966, 1970, 1971). He, too, used Bordes' system but, rather than seeing which of the French "variants" the Crimean assemblages most resembled, Gladilin subdivided the Crimean materials into variants based upon "chronologically stable" attributes, the amount of bifacial flaking, the presence or absence of Levallois technology, the percentage of denticulated tools, and tool size (the latter not considered by Bordes to be significant).

Gladilin subdivided the Crimean Middle Paleolithic into several "variants": a Levallois-Mousterian (sites: Shaitan- Koba, Kholodnaya Balka, and Bahkchisarai); Levallois- Mousterian of Acheulian Tradition (site of Starosele); Mousterian of Acheulian Tradition (sites of Chokurcha and the lower layer of Volechiy Grot); and, a Micro-Mousterian of Acheulian Tradition (site Kiik-Koba, upper level).

Gladilin's classification clearly followed the perceptions of Formosov, recognizing the significance of the often numerous bifacially retouched tools in some assemblages and their absence in others. Like Bordes, however, he also viewed significant bifacial flaking in an assemblage as evidence for a developmental connection with the Acheulian, while its absence indicated to him a different ancestry.

Klein, reflecting a western European perception, viewed the tendency toward bifacial flaking, but without true bifaces, as less significant than the proportional occurrences of the Bordian tool "types". This led Klein to see a greater similarity between the French and Crimean assemblages than now appears justified, although some Crimean industries are still even now called "Charentoid" (Kozlowski 1991).

By the early 1970s, Gladilin had abandoned Bordian systematics for the Crimean Middle Paleolithic, since he felt it failed in its most important function - it could not accurately describe the morphology of a significant number of Crimean Middle Paleolithic tools (Gladilin 1976). For example, Bordes' type canted scraper (racloir dejete) was represented at the site of Starosele by a large diversity of shapes, different numbers of retouched edges, and their combinations. There were rectangular scrapers with three retouched edges, as well as those with crescent shapes and only two retouched edges, and a great deal in between. A number of these tool shapes are rarely found in the French Mousterian; however, they are both abundant and distinct in the Crimea. This problem extended to denticulates, as well as to points and those bifacially retouched scraper/points which plague any typologist of Crimean assemblages who tries to use Bordian systematics. Gladilin (1976) felt that the use of a single type to encompass such wide morphological variability, whether it be of scrapers, denticulates or points, tended to blur

accurate descriptions and, therefore, meaningful comparisons among assemblages.

Gladilin's (1976) classification system was being developed at a time when massive new field work was being undertaken in the Crimea. From 1969 through 1974 Y. Kolosov discovered ten stratified Middle Paleolithic sites in the eastern Crimea: three rock shelters (Prolom I, II and Zaskalnaya IX); two open-air sites (Sary-Kaya and Krasnaya Balka) and five possibly buried rock shelters (Ak-Kaya III and IV, and Zaskalnaya III, V, and VI). His remarkable success came from a modified survey strategy which emphasized the search for buried rock shelters on the hill slopes near limestone cliffs of the northern line of the Second range and along the Third range of Crimean Mountains. With the additional data derived from these newly found sites, the Crimean Middle Paleolithic could be seen in spatial terms and a distinction was made between the Eastern and Western Crimean sites (Bibikov 1971, Gladilin 1976).

Eleven years later, another expedition headed by Y. Kolosov, this time to the western Crimea, repeated this survey strategy with impressive results. Between 1986 and 1988, four important stratified Middle Paleolithic sites were found and test excavated: Kabazi II and V, GABO, and Ulakli.

Kolosov's work significantly changed how the Crimean Middle Paleolithic was perceived. It became clear that the vast majority of Middle Paleolithic sites were located along a 5 km. wide, 70 km. long band of the Second and Third range of Crimean Mountains. By 1988, a total of 28 deeply stratified sites and 76 surface occurrences had been discovered in this ecotone between the steppe and the mountains.

THE PRESENT

Using Gladilin's (1976, 1985) approach, Y. Kolosov, V. Stepanchuk and V. Chabai (1993) subdivided the Crimean Middle Paleolithic into four industries, two found only in the eastern Crimea and two only in the western Crimea. The eastern industries are called Kiik-Koba and Ak-Kaya, while the western two are referred to as Staroselian and the Western Crimean Mousterian (fig. 1). While each industry is defined primarily on typological criteria, there also are technological traits which distinguish some industries from others. A brief description of each follows:

The Ak-Kaya Industry

The sites: a) open-air, Sary-Kaya and Krasnaya Balka; b) rock shelters with stratified occupations, Chokurcha I, Volchiy Grot, Prolom II, and Adji-Koba; c) buried rock shelters with multiple stratified occupations, Ak-Kaya III and IV, Zaskalnaya II, V, Va, and VI.

Technology. Raw material reduction resulted in three main core forms: radial, multiple platform, and parallel. There was little core platform facetting (IFs, +/-30, IF, 45) and very few elongated blanks were produced (Ilam, from 3 to 14).

Typology. The tool assemblages are characterized by an abundance of bifacially flaked tools (IB, ca. 20) but without true handaxes. The most common form (Kolosov 1986) is a naturally backed, bifacial knife resembling either Bochstein or Klaussennishe types (fig. 2), first defined in Germany (Bosinski 1969). Combined, unifacial and bifacial knives and scrapers (fig. 3) dominate the tool assemblages (± 80%), while points never account for more than 10%, and denticulates and notches 5%. Upper Paleolithic tool types (endscrapers, burins, perforators, etc.) are very rare (Kolosov 1986).

Hominid Fossils. Parts of five Neanderthal children were found in layers III and IIIa of Zaskalnaya VI. Also, Zaskalnaya Va produced an occipital of an adult Neanderthal (Danilova 1983; Kolosov, Kharitonov and Yakimov 1975).

The Kiik-Koba Industry

The sites: rock shelters, Prolom I and Kiik-Koba, upper layer (Stepanchuk 1991, 1992).

Technology. Core reduction was almost exclusively by radial/discoidal strategies with very low platform facetting (IFs, ± 25; IF, ± 37) and very little elongated blank production (Ilam ± 11).

Typology. The characteristic tool is a point, among both unifacial (40%) and bifacial (50%) tools. Unlike the Ak- Kaya, there are relatively few bifacial tools (IB, 15) and, while bifacially retouched knives are present among the bifacial tools (5%), this compares with 40% in the Ak-Kaya. Scrapers, which account for only ca. 40% of the tools and the points, as well, tend to be canted - converging off-axis (fig. 4). Denticulates and notches are rare (ca. 10%); Upper Paleolithic-like tools are very rare and atypical. Hominid Fossils. Two Neanderthal burials, of an adult woman and a child were found at Kiik-Koba (Bonch-Osmolowski 1940). While Bonch-Osmolowski thought both came from the upper layer, Gladilin (1979) demonstrated that the adult burial was associated with the lower layer. The exact association of the child is not clear.

The Staroselian Industry

The sites: a) shallow rock shelter, Starosele - two levels were recognized by Formosov (1958); open-air sites of GABO (both layers), Kabazi V (all layers), and Kabazi II (Units I and III, although Unit I is derived).

Technology. There are two technological groups (Chabai 1991). The first, represented at Kabazi V, Kabazi II, unit III, and GABO, has a preponderance of radial cores, a low incidence of facetting (IFs, 13 to 18; IF, 27 to 37), and very little elongated blank production (Ilam, ca. 5). In the second group, seen at Starosele and Kabazi II, unit I, blank production was mainly from single platform cores, blanks are marginally more likely to have facetted platforms than in the first group (IFs, ca. 20; IF, ca. 42), and the production of elongated blanks was more common (Ilam, ca. 20).

Typology. The dominant tool is the scraper, accounting for between 60% and 70% of the tool assemblages. Of the scrapers, convergent forms are most common (40%) and they tend toward trapezoidal, crescent, and truly rectangular shapes. Points rarely exceed 20% of any tool assemblage and they tend to be leaf shaped or triangular, although at times they can be elongated trapezoidal. Denticulates and notches verge around 17%, while Upper Paleolithic types are rare (fig. 5).

The Staroselian has numerous points and scrapers with limited bifacial retouch which acts to thin one or more tool edges; distal, proximal, or lateral. True bifacial tools are uncommon (IB, 5-10); they are mainly plano-convex leaf-shaped "points", as well as triangular and crescent shaped points often made on large, transversely struck flakes (fig. 5:1).

Hominid Fossils. A child burial was uncovered at Starosele in a test pit during the first season of excavations in 1953 (Formosov 1958). The young age of the child, some 18 months, made it difficult to determine whether it was Neanderthal or modern. Various chemical tests failed to prove whether or not it was contemporaneous with the fauna, and the stratigraphic position, at least according to Zamiatnin, was not sufficiently clear to firmly establish its in situ status (Roginski, Gerasimov, Zamiatnin, and Formosov 1954). In spite of this, most have taken the view that the child was associated with the Staroselian industry and that the child exhibits a mixture of "primitive" and modern traits (Oakley 1964; Alexeyev 1976).

The Western Crimean Mousterian Industry The sites: a) rock shelters of Bahkchisarai (lower layer), Chokurcha II and Kabazi I; b) cave of Shaitan-Koba; and c) the partly open-air site of Kabazi II, unit II (Chabai 1990).

Technology. Based mainly upon the stratigraphy at Kabazi II, where more than 12 occupation floors are superimposed, three stages of technological development have been recognized. The earliest, is characterized by a balance between blank production from radial and single platform core strategies, relatively little platform facetting (IFS, 12.5 to 28; IF, 27 to 50), and little elongated blank production (Ilame, 9 to 12). This technological stage is present at Bahkchisarai (lower layer), Kabazi I, and Shaitan-Koba (lower

layer). The second technological stage, seen at Shaitan-Koba (upper Layer), Kabazi II, unit II (levels 9 through 5), is characterized by a marked increase in the use of single or opposed platform cores (up to 70%), the appearance of a small incidence of Levallois "tortoise" core preparation and their products (no more than 10% of all flakes) (fig. 6:6-7), a significant increase in the use of platform facetting (IFs, 47.6 in level 8 of Kabazi II, unit II; IF, ca. 70), and a marked increase in elongated blank production (Ilam, 20).

Stage III, the youngest at Kabazi II, unit II (levels 4 through 1a), had only blank production from single and opposed platform cores, some true blade cores were exploited volumetrically, and centripetally prepared Levallois flakes are absent. Also, elongated blank production increased (Ilam, 30+), and the facetting of platforms declined (IFs, 31.3 and IF, 53.3 at Kabazi II, unit II, level 1a).

This clear sequence records the development of uni- and bidirectional core reduction strategies from their origin in a Biache-like method (Boeda 1988) into a Rocourt-like (Otte, Boeda and Haesaerts 1990) method (Chabai, in press).

Typology. In spite of the technological evolution, there is no comparable vectored change in the tool assemblages. Scrapers are most common (ca. 65%), followed by points (18% to 27%), denticulates (ca. 10%), and notches (ca. 5%). Bifacial tools are uncommon. Simple sidescrapers are most numerous (fig. 6:6); convergent forms are rare. Points are often elongated and some truncated blades also occur (fig. 6:1-2). Laterally retouched blades are numerous in the last two technological stages (fig. 6:3-4,8).

Hominid Fossils. No hominid fossils have been found.

THE MIDDLE PALEOLITHIC SEQUENCE

While it takes only representative lithic assemblages to define technological and typological variability and to subdivide them into "industries", it is quite another matter to document a temporal sequence for these industries. Although Bonch-Osmolowski (1934) posited a sequence based on the generalized "evolutionary" ideas of the period, he had no local stratigraphic basis for doing so. In fact, until the excavations at Kabazi II, only the first excavation, that of Kiik Koba, contained more than a single industry, in spite of multiple occupation layers at a number of sites.

Even at Kabazi II, the stratigraphic sequence is far from certain, beyond the fact that the Staroselian of unit III underlies the Western Crimean Mousterian of unit II. The Staroselian of unit I, while overlying the Western Crimean Mousterian, is colluvially derived from deposits further up- slope and so has no true stratigraphic relationship with unit II (Chabai and Zuk, in press) . At Starosele itself, some 4.5 m. of deposits were only divided into two stratigraphic units by Formosov and, then, only during his fourth field season. Present excavations, while just beginning, have uncovered four stratigraphically isolated occupations and it is not yet certain that each falls within the parameters of the Staroselian (Marks, Demidenko and Usik, in press).

The relative temporal positions of the four industries is unknown. At best, the Western Crimean Mousterian overlies the Staroselian at Kabazi II. Given the absence of stratigraphic confirmation from other sites, even this relationship must be considered tentative.

If the relative dating of the industries is preliminary, at best, absolute dating is almost non-existent. The first "absolute" dates reported were done in the 1950s on bone from unknown stratigraphic context at Sterosele. One date, using an experimental Uranium/Actinium ratio, was reported as 26,000-30,000 BP, while two others using a Thorium/Uranium ratio were given as 31,000 BP and 110,000 BP (Formosov 1958).

More recently, a radiocarbon date was obtained from the Ak- Kaya of Zaskalnaya V, level 2, of greater than 50,000 BP and a single date from Zaskalnaya VI, level 2, produced a date of greater than 45,000 BP (Kolosov 1983). Given the limitations of radiocarbon, these dates tell us little we do

not already know. They do suggest, at least, that the Ak-Kaya is not particularly young, a temporal position often attributed to the Crimean Middle Paleolithic, sensu latu (Oakley 1964; Anikovich 1992).

Without even firm relative chronology, much less any reasonable absolute chronological controls, it becomes extremely difficult to deal convincingly with questions of origins, inter-industry relationships, and even intra- industry evolution. Yet, as elsewhere in the Old World, the absence of clear chronological controls did not discourage interpretations; in fact, it permitted a myriad of them.

ORIGINS AND DEVELOPMENT: A SHORT HISTORY

Historically, attempts to explain observed typological and technological variability mainly used migration models. These models took three forms; into the Crimea, out of the Crimea, and seeing the Crimea as one link in a long chain along which people moved in both directions.

Two very basic questions were approached through migration models: from where did the Middle Paleolithic inhabitants of the Crimea come; and where did they go? Obviously, people must have moved into the Crimea at some point, although not necessarily beginning in the Middle Paleolithic.

S.N. Bibikov (1961), thought that such a timing was appropriate and proposed that Middle Paleolithic peoples abandoned the Caucasus and moved, en mass, into the Crimea and the Russian plain. He based this proposal on two main assumptions: that there was no Lower Paleolithic in the Crimea and that there was an abundance of Lower Paleolithic with bifacial tools in the Caucasus. Gladilin (1976) rejected this idea of a "Caucasus invasion of the Crimea". He pointed out that it was not possible to move between the Caucasus and eastern Europe during the Last Interglacial when the Lower Paleolithic florished in the Caucasus because of the marked raise in the Black and Caspian Sea sea levels which connected the two (the Karangat transgression). He also argued (Gladilin 1976) that some similarities existed between the Central European "Micoquien" assemblages and those industries with bifiacial retouch on the Russian plain and in the Crimea (specifically, the Kiik-Koba and Ak-Kaya), while he saw were no similarities between the eastern European assemblages and those from the Caucasus.

Following on the idea of Central European/Eastern European connections, Gladilin (1985) proposed two facies of Eastern European/Crimean Middle Paleolithic: one of Bochstein facies and the other of Eastern Micoquien facies. He suggested that the population which made the bifacial tool kits with Bochstein and Prodnik knives moved from Central Europe into the Crimea (the Ak-Kaya industry) at the end of Riss or the beginning of the Last Interglacial. On the other hand, the Eastern Micoquien facies was seen as part of a broad expanse of eastern Micoquien peoples. Gladilin (1985) included within this eastern facies of the Micoquien sites from northern and eastern Ukraine (Zutomir, Rihkta, Antonovka I and II, and Alexandrovka) and the Staroselian in the Crimea, at least as seen at Starosele and reported by Formosov (1958). According to him, all these sites share common features in tool shape and in the methods of their manufacture.

Gladilin's ideas were not widely accepted. Kolosov (1986), rejected a migration model for, at least, some of the the Crimean Middle Paleolithic, proposing instead that the origins of the Ak-Kaya lay in a local Crimean Acheulian base. This Acheulian was to be seen as numerous surface finds of "archaic bifacial tools with accomodation elements" near the valley of Bodrak river. As part of the local evolutionary model, Kolosov rejected any links between the Bochstein-Prodnik assemblages of Central Europe/northern Ukraine and the Ak- Kaya industry. He accounted for similar bifacial tool forms in both as the result of independant, converging development. He suggested that this came about because of similar raw material forms - mainly an abundance of relatively thin plaquettes, which can be

easily reduced bifacially into Bochstein/Prodnik type tools.

Kolosov's position is problematic. The artifacts he recognized as Acheulian come from large flint outcrops which were used from Paleolithic to Late Medieval times. These so-called "proto-Bochstein/Prodnik" tools might be no more than unfinished tools or pre-cores of Neolithic or even Chalchooithic times or, perhaps, at best, preforms belonging to the Ak-Kaya itself. If this is case, then there is no technological background for any local Ak-Kaya development during the Riss or Last Interglacial.

In any case, during the Last Interglacial and probably into the early Pleniglacial, the Karangat transgression of the Black Sea basin made the Crimea into an island, isolating it from the rest of Eastern Europe. Yet, a Pleniglacial origin of the Ak-Kaya from Eastern Europe is possible but without absolute dates any such claims would be premature.

Gladilin's (1985) view of the "Eastern Micoquien" aspect of the Staroselian has been rejected by Chabai and Yevtushenko (in press), based upon comparative morphological analysis of tool kits. Their conclusion is that the Staroselian industry (from Starosele, Kabazi II/I, Kabazi II/III, and Kabazi V) have few if any similarities with the northern and eastern Ukrainian sites listed by Gladilin. On the other hand, the northern assemblages do show considerable typological homogeniety (Kuharchuk 1989).

The disappearance of the Staroselian was also attributed to outward migration by Formosov (1958) but without even using any typological/technologica arguements. He suggested that the people who made the artifacts at Starosele, along with the rest of the "Mousterian population" of the Crimea, and those of the Russian Plain and the northern Caucasus, moved northward to the Don River where they initiated the Upper Paleolithic Kostenki-Streletskaya culture.

Recently, it has been pointed out that the Staroselian and materials from Barakaevskaya Cave in the Caucasus show some similarities (Kolosov, Stepanchuk, Chabai, 1993a). While this seems possible, its meaning is still obscure, since niether is dated. The origin of the Kiik-Koba industry has been viewed as local evolution but its disappearance has been seen as a result of outward migration northward to the Middle Dnieper region and eastward to the northern Caucasus (Stepanchuk 1991). The base of the Kiik-Koba is seen as represented by two in situ assemblages - Kiik-Koba (lower level) and Kabazi II/IV - as well as the surface site of Krasniy Mak. This assemblage type, characterized by very small amorphous flake tools with some roughly bifacial points, underlies the Staroselian at Kabazi II and appears to date to the Last Interglacial (Chabai 1991). Thus, at least temporally, this evolutionary development is possible.

The disappearance of the Kiik-Koba industry through migration was based upon the absence of any local Upper Paleolithic industry with bifacial technology (Stepanchuk 1991). However, there are no Crimean Upper Paleolithic industries which show connections to any of the Middle Paleolithic industries, including the blade producing Western Crimean Mousterian. The absence of such similarities does not mean, a priori, that migration was the cause of the disappearance of the Kiik-Koba industry. His claim that the sites of Orel (Middle Dnieper) and Il'skaya (northern Caucasus) have materials typologically similar to the Kiik-Koba is interesting, but no specific data have been provided.

Of all the Crimean Middle Paleolithic industries, only the origins of the Western Crimean Mousterian seem secure: at least, there is general agreement. It is commonly held (Kolosov 1972, Gladilin 1976, Chabai 1990) that it appeared in the Crimea as the result of an eastward spread from the Balkan-Danube region sometime during the Pleniglacial when the two regions were connected because of a much lower Black Sea (Dimitrov, Philipova and Bojikova 1982). Not only was such a route possible but there are strong technoloigcal and typological connections (Chabai 1991) between the first technological stage of the Western Crimean Mousterian (Kabazi II/II/8-9 and Shaitan Koba) and the early Wurm assemblages of Grot Buteshti in Moldovia (Ketraru 1970) and

probably with Layer XX of Crvena-Stiena in Montenegro (Basler 1975).

Paleoanthropologists have contributed their own version of migration models. Y. Roginski (1954) saw a close relationship between the Starosele child and the Skul I child. E. Vleck (1975), V. Yakimov and V. Kharitonov (1979) described similar features for the Zaskalnaya VI and Kiik-Koba neanderthals and those of Tabun I and Amud I, while also claiming few morphological similarities between the Crimean neanderthals and western European ones. The implication of these observations, a Middle Paleolithic Levantine/Crimean "connection", has been ignored by all archaeologists.

In summary, the various migration models provide little explanation for Crimean Middle Paleolithic industrial variability or, for that matter, any convincing scenario for the origin of one or more Crimean industries. Aside from the theoretical problems of migration models, and the absence of an even relative chronology for the Crimean industries, the models lack clear technological and typological expectations. Given Crimea's position between the Near East and Asia on one side and Europe on the other, the possibility - even the likelihood - of population movements into and out of the Crimea during the Middle Paleolithic must be considered. It is not clear, however, whether population movements can account for most industrial variability, beyond, perhaps, for some initial appearances. It is surprising how little consideration has been given to relationships between and among the Crimean Middle Paleolithic industries and to those factors, other than population movements, which might have led to the Middle Paleolithic variability seen in the archaeological record.

OTHER MIDDLE PALEOLITHIC VARIABILITY

While typological variability might be explained by possibly different geneses and development of some Middle Paleolithic industries, other variability may be viewed as resulting from different organizational patterns. This approach accepts the striking intra-industry typological consistencies but seeks to explain non-typological variability as a function of differential adaptations to available resources, as reflected in the exploitation of lithic raw materials, group mobility, and faunal exploitation. Thus, intra-industry variability, as well as inter-industry similarities, must be viewed in relation to each of these factors. It is fully admitted that only a fraction of the desirable data are available and the absence of an absolute chronology within and among the industries makes any conclusions tentative. Yet, there are sufficient data to make such an initial approach worthwhile.

Because of gaps in the available data, only those occupations were chosen which now have clear stratigraphy, extensively studied artifact and faunal assemblages, and well described intra-site artifact and feature distributions (Kolosov, Stepanchuk, and Chabai 1993). From these data, patterns have been postulated which will be tested as additional information becomes available from ongoing field and laboratory work.

As noted earlier, there are two clusters of Middle Paleolithic sites in the Crimea: one in the "west" (the Staroselian and Western Crimean Mousterian), and one in the "east" (the Ak-Kaya and Kiik-Koba). Unfortunately, none of the Staroselian occupations can be used here. The published materials from Formosov's Starosele excavations are mixed and their stratigraphic associations cannot be separated (Marks, Demidenko, and Usik, in press). At Kabazi II, the origin of the upper Staroselian level is colluvial (Chabai and Zuk, in press), while the lower Staroselian layer so far has produced only a poor artifact sample. Also, faunal studies have just started for Kabazi II and Kabazi V.

LITHIC ASSEMBLAGE VARIABILITY

To examine possible non-typological inter-site and inter- industry structural relationships, the following were considered (Table 1): 1, distance to raw material; 2, the

blank to core ratio (fig. 7:A); 3, the unifacial tool to core ratio (fig. 7:B); 4, the percentage of tools per assemblage (fig. 7:C); 5, the density of artifacts per cu. m. (fig.7:D) 6, the percentage of dominant species (fig. 7:E); and, 7, the number of bones of dominant species per MNI (fig. 7:F).

With the exception of Prolom I and II and Kiik-Koba, all sites are between 400 m. and 1,500 m. of a known raw material source. The exceptions are from 10 to 15km. from the nearest known source of the high quality black flint, which comes in thin plaquettes. This flint was exclusively used in the production of bifacial tools at Prolom II, and for all tools at Prolom I and Kiik-Koba. At Prolom II, only unifacial tools were made on a brown flint available some 1000 m. from the site. The bifacial tools were manufactured elsewhere and imported into Prolom II. There is even an example from Prolom II, layer II, of a bifacial tool made on volcanic material available no less than 40 km. away.

On the other hand, Prolom II has exhausted cores, small unifacial tools (av. 3/4 cm.), a significant number of reutilized broken tools on black flint, all of which indicate some on-site blank and tool production, as well as tool rejuvenation, in spite of a scarcity of black flint (Stepanchuk and Chabai 1986).

The tendency for a co-association between greater distances from raw material and high blank to core ratios is clear, particularly at Prolom I and Kiik-Koba (av. 94.5:1). This also applies to the black flint at Prolom II, but not to the brown flint; thus, the overall effect are low blank to core ratios, comparable to those at Western Crimean Mousterian sites (fig. 7:A). At Ak-Kaya sites close to raw material, the blank to core ratios range from 40:1 to 70:1, with one assemblage showing a much higher ratio (209:1 at Zaskalnaya V, layer II). At the Western Crimean Mousterian sites, it ranges from only 12:1 to 31:1, with Shaitan-Koba, layer II, an outlier at 41:1 (fig. 7:A). Thus, again, it appears that the blank to core ratios were determined by more than just distance from raw material.

The unifacial tool to core ratios show a similar pattern (fig. 7:B); with the exception of the disturbed, uppermost layers at Zaskalnaya V and VI, all the Ak-Kaya and Kiik-Koba assemblages exhibit high ratios (8:1 to 19:1), regardless of distance to raw material. All Western Crimean Mousterian assemblages, close to abundant raw material, have low tool to core ratios (2.6:1 to 5.4:1).

The percentage of all tools in each assemblage ranges from 15% to 30%, with three layers from Prolom II (34% to 39%) and Kabazi I at 44% having somewhat more. The site of Sary-Kaya stands out from all others for both the unifacial tool to core ratio and the percentage of tools in the assemblage (fig. 7:B,C). In the 1977 excavations, which did not differentiate among the occupation layers, the unifacial tool to core ratio was 26:1. In the 1985/6 excavations, which recognized three distinct occupations, there was not a single core found in one layer with 21 unifacial tools and only one core each in the other two layers. Tool samples are small, yet, retouched tools make up 78.9% of the combined lithic assemblages! Little blank production took place on-site.

Artifact density per cu. m. clustered into four groups: extremely low (20 to 70); low (150 to 300); high (400 to 1000); and, more than 1010 (fig. 7:D). These consistently cluster with other observations. Only Prolom II and Sary-Kaya fall into the extremely low group. In the low group fall all the Western Crimean Mousterian occupations and the uppermost, disturbed layer from Zaskalnaya V: all other Eastern Crimean occupations from Zaskalnaya, Prolom I and Kiik-Koba fall into the high or very high artifact density group.

Based on these six data categories, the occupations can be grouped into five general types (Table 1).

Table 1. Types of Occupations, by Sites.

TYPES	SITES/OCCUPATIONS
Zaskalnaya	All occupations at Zaskalnaya V and VI.
Prolom	Layers I-IV of Prolom II.
Kiik-Koba	Kiik-Koba, upper, and Prolom I.
Sary-Kaya	three layers at Sary-Kaya.
West-Crimean	Shaitan-Koba, Kabazi I, Kabazi II (Unit II), and Chokurcha.

The Zaskalnaya type has high occupational intensity (high artifact densities, medium to high blank to core ratios and high tool to core ratios). Among other activities, core reduction and bifacial tool production were carried out on- site. Apart from the deflated and eroded uppermost level at Zaskalnaya V and VI, each occupation has fireplaces, shallow pits and even burials. In Zaskalnaya VI, layer II, near the limestone wall was found a small pit, 20 cm. in diameter and 5 cm. deep, in which were recovered eight finished, complete bifacial tools (Kolosov 1986:19); the earliest evidence for "caching" in the Crimea and among the earliest anywhere.

Everything suggests that Zaskalnaya V and VI saw either intensive, long term occupations or numerous repeated occupations of some duration. Kolosov (1983, 1986) interpreted these sites as long-term, "site-workshops".

The Kiik-Koba type is shows high occupational intensity (high artifact densities, as well as both high blank and high tool to core ratios). These latter, differing from the Zaskalnaya type, are associated with a paucity of nearby raw material. Unifacial and bifacial tool production took place on-site, from plaquettes of black flint which was imported from 10 to 15 km. away. Both Kiik-Koba and Prolom I had hearths, while the upper level at Kiik-Koba also produced a Neandertal burial and, probably, a "dwelling construction" (Kolosov, Stepanchuk and Chabai 1993).

The Prolom type of site results from ephemeral occupations (extremely low artifact densities, high percentages of retouched tools and high tool to core ration but low blank to core ratios). Lithic production at Prolom II differed by raw material utilized. The full range of raw material reduction and unifacial tool production took place on-site, using both poor local and high quality exotic raw material. However, all bifacial tools were produced only on the high quality exotic raw material. Given the paucity of bifacial thinning flakes and the low blank to core ratios, it is clear that many, if not all, of the bifacial tools were produced elsewhere. Thus, this site type represents occupations which were sufficiently long to warrant expedient exploitation of some local materials but brief enough that the importation of many bifacial tools took place.

The Sary-Kaya type of site seems to represent ephemeral occupation (extremely low artifact densities, very high tool to core ratios and the extremely high percentage of retouched tools). These data indicate that tools were produced off-site, perhaps, at nearby areas of production, such as Zaskalnaya. Features such as hearths, caches, and other constructions have not been found.

Imported bifacial tools range from 26% to 50% in the tool- kits and, with the cache of bifacial tools at Zaskalnaya VI and the use of only imported raw materials for their production at Kiik-Koba, Prolom and Sary-Kaya type sites, it appears that bifacial tools were differently curated having, perhaps, a special economic role in both the Ak-Kaya and Kiik-Koba industries.

The West-Crimean type assemblage seems to reflect low occupational intensity and a tendency towards mobility. This is seen in the low artifact densities and in the low blank to core and tool to core ratios (fig. 7:A,B). Yet, from the assemblage structure, it is clear that both primary flaking and tool production took place on-site. Given the relatively moderate percentage of tools in each assemblage, it appears that there was little tool rejuvenation. The absence of special structures, and burials, are in accord with an interpretation of brief occupations.

MIDDLE PALEOLITHIC FAUNAL ASSEMBLAGE VARIABILITY

While there are five structural clusters in the lithic assemblages, the faunal assemblages fall easily into only four groups (fig. 7:C,D). The most common is marked by rather equal proportions of the main, large herbivore species present, and a generally low (less than 17:1) to somewhat low (less than 31:1) ratio of bones per MNI for these herbivore species. The number of large species present varies from 3 (*Mammuthus sp., Equus sp.*, and *Saiga sp.*) to 9 (those above, plus *E.hidruntinus*, Bos/Bison, *Cervis elaphus, Coelodonta ant., Rangifer tar.*, and *Megalocerus g.*), although the first three appear to be most important, based on the number of their remains. This faunal assemblage structure is found at those occupations characterized by the eastern Crimean Kiik- Koba and Zaskalnaya lithic assemblage types.

The second type of faunal assemblage exhibits a similar, if somewhat more limited range of large herbivore species (from 3 to 5) but with a tendency for one or two to be proportionately dominant. This type is present at Kabazi I, where *Equus sp., Saiga sp.*, and *E. hidruntinus* are present but *Equus sp.* accounts for some 60% of the remains (fig. 7:E). Shaitan-Koba is a bit more complex, since five large herbivore species are present (the above, plus Bos/Bison and *Cervus elaphus*) and two of them combined , *Saiga sp.* and *E. hidruntinus*, account for about 70% of the remains. In both cases, however, there is a medium to high number of bones per dominant species MNI (fig. 7:F).

A third faunal assemblage structure is characterized by a significant dominance (75% to 100%) of one species of large herbivore (*E. hidruntinus*) and a high number of bones (44 to 82) per MNI. This type of assemblage is found in all the Unit II occupation layers at Kabazi II, as well as at Chokurcha II (Bader, 1979), all belonging in the West-Crimea lithic assemblage group (fig. 7:E,F).

A similar faunal pattern may be present at Sary-Kaya but very poor bone preservation prevents certainty. Yet, at Sary-Kaya only *Equus sp.* teeth were recovered in 1985/86 from the three occupation layers. During Kolosov's 1977 excavations, both *Equus sp.* and Mammuthus sp. were found without stratigraphic control. Thus, it is possible that different layers and areas vary in faunal patterning but, seemingly, all are dominated by *Equus sp.*

The fourth type of faunal assemblage patterning has a very large number and diversity of species. This is found at Prolom II, where 25 different mammalian species were recovered(fig. 7:E,F) . Aside from the herbivores noted above from other sites, there was also Sus scrofa, but the major variety came from various predators: three kinds of foxes, wolf, two kinds of bears, hyaena and panther. At Prolom II, the only site with this faunal assemblage structure, there were discrete areas of complete but gnawed bones and, at least, one area with small bone fragments, stone tools, and a hearth. It is clear that this assemblage resulted from both human and predator activities which is not surprising since Prolom II is one of the few true cave sites in the sample.

DISCUSSION

The relationships among the three major concerns here - typologically defined industries, lithic assemblage structures, and faunal assemblage structures - are, at times, clear but, at other times, quite complex.

In the western Crimea, associations are clear. The Western Crimean Mousterian shows a strong tendency toward low occupational intensity, associated with the exploitation of one (*E. hidruntinus*) or, at most, two herbivore species (*E. hidruntinus* and *Saiga sp.*). Butchering took place on-site and, in the case of Kabazi II, there are indications that the site location was where some of the animals were killed. In the case of Shaitan-Koba cave the pattern is different. The animals were not killed in the cave and species diversity indicates a more extensive exploitation of the surrounding landscape than at other Western Crimean Mousterian sites. Yet, its lithic assemblage structure suggests short-term occupations, at best. Being a cave, Shaitan-Koba may represent a series of different seasonal, ephemeral occupations with the exploitation of a wider range of species than if all occupations had taken place during a same season.

Although virtually all Western Crimean Mousterian sites indicate ephemeral occupations, the reduction of raw materials and the production of tools took place on-site. There is little evidence, however, for much tool rejuvenation and this may reflect the abundance of locally available flint combined with short-term occupations. Also, Kabazi II was on a rapidly aggrading slope where each occupation was only briefly exposed and, thus, its artifacts were not available for additional utilization when the site was revisited.

The eastern Crimea is more complex. Typologically, there are two different industries, the Ak-Kaya and the Kiik-Koba, but the lithic and faunal assemblage structures tend to cross-cut the typological division. Both of the Kiik-Koba industry sites show intensive occupation and a balanced exploitation of different herbivore species. This pattern is shared with all of the Ak-Kaya industry occupations at Zaskalnaya V and VI.

On the other hand, there are two Ak-Kaya sites, Sary-Kaya and Prolom II, which must be interpreted as highly ephemeral occupations. In the case of the former, the faunal assemblages suggest the hunting of mainly single species per occupation, and the importation of finished tools (mainly bifacial), presumably for butchering. For Prolom II no such activity specialization is visible. While it is not certain which of fauna resulted from cultural activity, the lithic materials show both on-site unifacial tool production and long distance importation of bifacial tools.

Although systematic surveys have yet to be carried out in either the eastern or western Crimea, the data presented so far permits preliminary constructs of the settlement system of each typologically defined industry.

The Kiik-Koba industry sample of two, while small, does suggest consistency of long term, intensive occupations and the exploitation of a wide range of herbivore species. There is no evidence for specialized activity loci across the landscape but systematic survey yet may find them.

The Ak-Kaya industry exhibits a complex settlement system, assuming that all sites are contemporaneous. The Zaskalnaya sites seem to represent long term, intensive occupations where the full range lithic reduction, tool manufacture, and tool rejuvenation took place. There appears to have been relatively little primary butchering and sufficient occupational duration to result in site features, such as hearths, one cache, and hominid burials. It is probable that this site type was supported by ephemeral sites of two kinds: that at Sary-Kaya which appears to be a kill/butchering station with no hearths, where little, if any, lithic production took place and where tools were imported and, presumably, meat was exported. The other ephemeral site type is seen at Prolom II which may represent a revisited, short- term hunting station. In this case, bifacial tools were imported but sufficient activities were undertaken at the

site that there was limited working of inferior, local raw material into unifacial tools. It is possible that Prolom II is another kind of primary butchering station but the high probability of carnivore activity, as well as human activity, makes any interpretation of butchering difficult.

Considering these three Middle Paleolithic industries, it seems that there were two quite distinct settlement systems. These systems are now known from a really small area, a band more more than 70 km. east/west by 5/7.5 km. north/south; that is, no more than ca. 420 sq. km. Even then, each system is seen only in part of the area, each covering, at most, some 210 sq. km. Of course, it is probable that the northern steppe and the higher mountains to the south were exploited to some extent under both systems. In spite of the paucity of Middle Paleolithic sites now known in those areas, is it reasonable that the Western Crimean settlement system and that of the Ak-Kaya exploited such small areas as indicated by known site distributions ? It seems unlikely.

The Western Crimean settlement system appears to have been based on patterns of high mobility, with some traditional seasonal hunting stations, such as Kabazi II and variable- seasonal stations, such as Shaitan-Koba. Given this high mobility, it is postulated that the Western Crimean Mousterian hunters took advantage of the large herds of herbivores which would have been spread out on the steppe during the Spring and early Summer, as they efficiently exploited from Kabazi II the herds of *E. hidruntinus* passing through the mouth of the Alma Valley. This mobility might well have resulted in the opportunistic shifting of site locations during different years, so that repeatedly visited hunting stations comparable to Kabazi II might well exist in the unsurveyed valleys adjacent to the Alma. Given the postulated Balkan origin of the Western Crimean Mousterian, even greater mobility might be expected over centuries, as opposed to over mere seasons.

The Ak-Kaya settlement pattern is best described as radiating (Mortenson 1972; Marks and Freidel 1977; Marks 1989). The very substantial occupations at the Zaskalnaya sites, with massive working of raw materials, hearths, burials, huge quantities of broken up faunal remains, the exploitation of a wide range of herbivores, and deep stratigraphy, all point to multi-seasonal residencies, if not consistent year round occupations. The kill/butchering site of Sary-Kaya only a few kilometers from Zaskalnaya shows that specialized activity loci were used to increase the amount of food available to Zaskalnaya beyond that which could be hunted directly from the site itself.

If this postulated radiating pattern did pertain during the Ak-Kaya, then more ephemeral sites should be found far enough from Zaskalnaya that their immediate areas could not have been easily exploited directly from Zaskalnaya. If other contemporary, long-term, intensively occupied sites of the Ak-Kaya exist, they should be found sufficiently far from Zaskalnaya that their exploitative territories would not overlap with it. Again, only systematic, large scale survey can test these possibilities.

What are the relationships among the Western Crimean Mousterian, the Ak-Kaya, and the Kiik-Koba industries, much less the still poorly known Staroselian? The answers are simply unknown. As yet, there is no way to even demonstrate their relative chronology, although most believe that the Kiik-Koba is older than the Western Crimean Mousterian. Did these industries exist in similar environmntal conditions or might their tool-kits and settlement systems reflect adaptations to differing conditions? Until there is clear paleoenvironmental data, as well as "absolute" chronological controls, among industries and among sites of the same industry, all time dependent models are untestable. Thus, present research is emphasizing absolute dating, systematic regional survey and paleoenvironmental studies. While much is now known, much is yet to be learned.

ACKNOWLEDGMENTS

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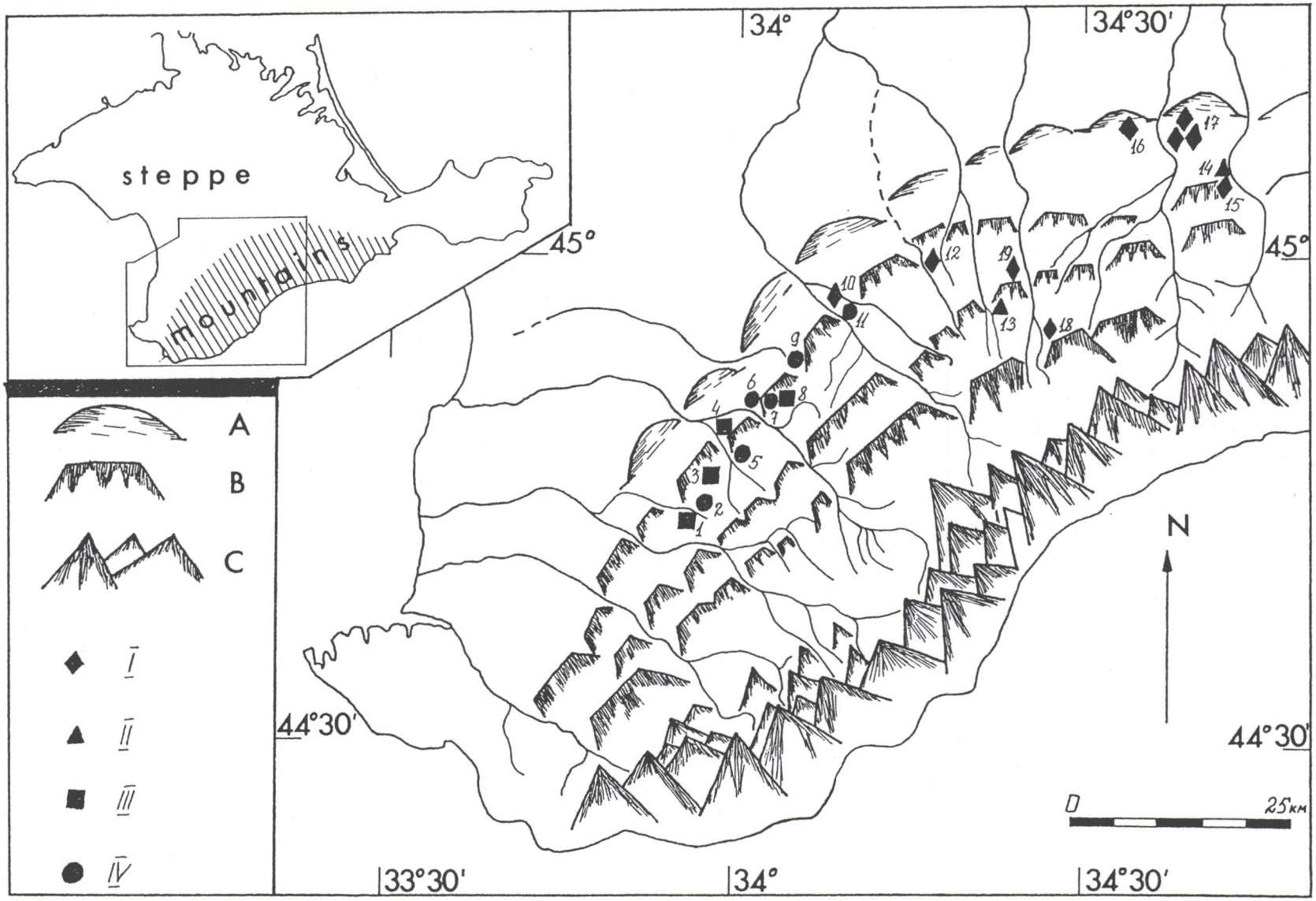
Figure 1. Map of the Crimea showing the distribution of landscapes and Middle Paleolithic sites.



A - the Third, B - the Second, and C - the Third range of mountains. Sites by industry : I - Ak-Kaya; II - Kiik-Koba; III - Staroselian; IV - Western Crimen Mousterian. Sites by number : (1) Starosele; (2) Bahkchisarai; (3) Ulakli; (4) GABO; (5) Shaitan-Koba; (6) Kabazi I; (7) Kabazi II; (8) Kabazi V; (9) Kholodnaya Balka; (10) Chokucha I; (11) Chokucha II; (12) Volchiy Grot; (13) Kiik-Koba and Kosh-Koba; (14) Prolom I; (15) Prolom II; (16) Sary-Kaya; (17) Krasnaya Balka, Ak-Kaya III and IV, Zaskalnaya III, V, VI, IX; (18) Adji-Koba; (19) Chagorak-Koba.

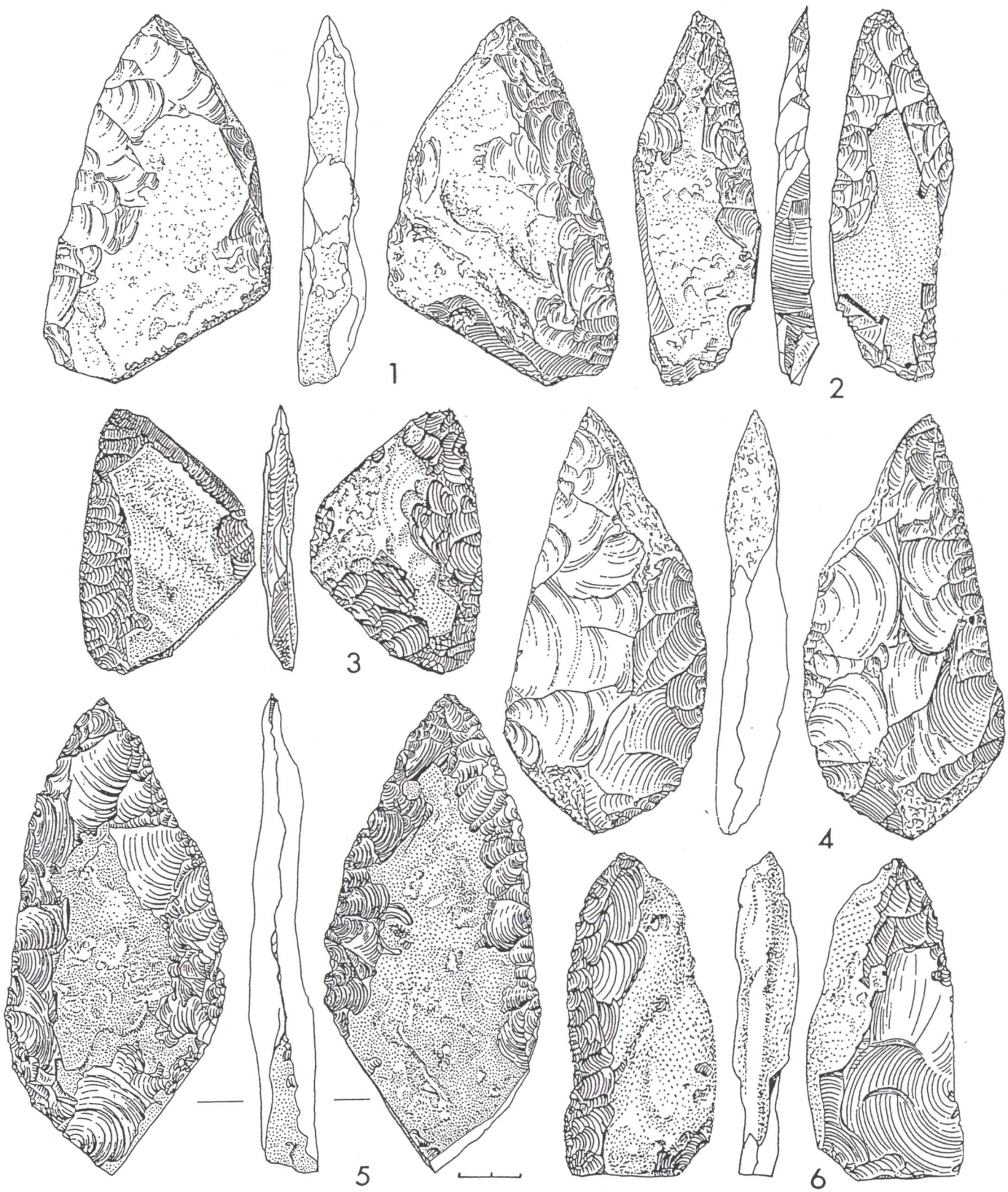


Figure 2. Bifacial knives of the Ak-Kaya (after Kolosov 1983). (1, 5) Zaskalnaya V, layer II, (4) layer III, (2) layer IV and (3, 6) Sary-Kaya. Bocksteinmesser type (1, 3, 6); Klausennische knife (2); Crescent-shaped knife (4); Ak-Kaya type knife (5).

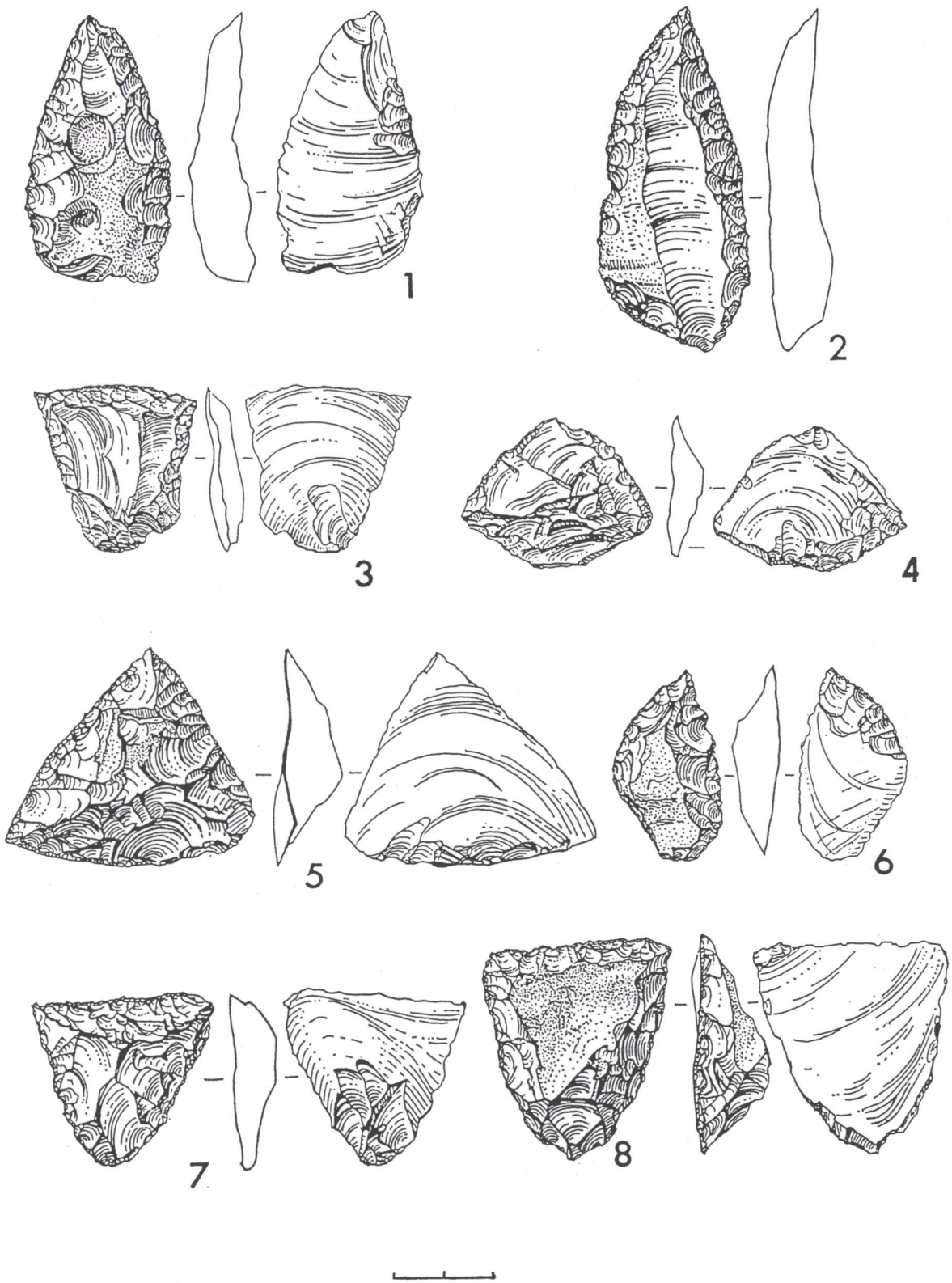


Figure 3. Unifacial tools of the Ak-Kaya. (after Kolosov 1983). (1-3, 6) Zaskalnaya V, layer III; (4-5, 7-8) Zaskalnaya, layer IV. Convergent scrapers with thinned base (1, 6); sub-trapezoidal scrapers or "racloir déjeté double" (3); triangular scrapers with thinned base or "racloir déjeté triple", or scrapers of the Chokurcha type (4-5, 7-8).

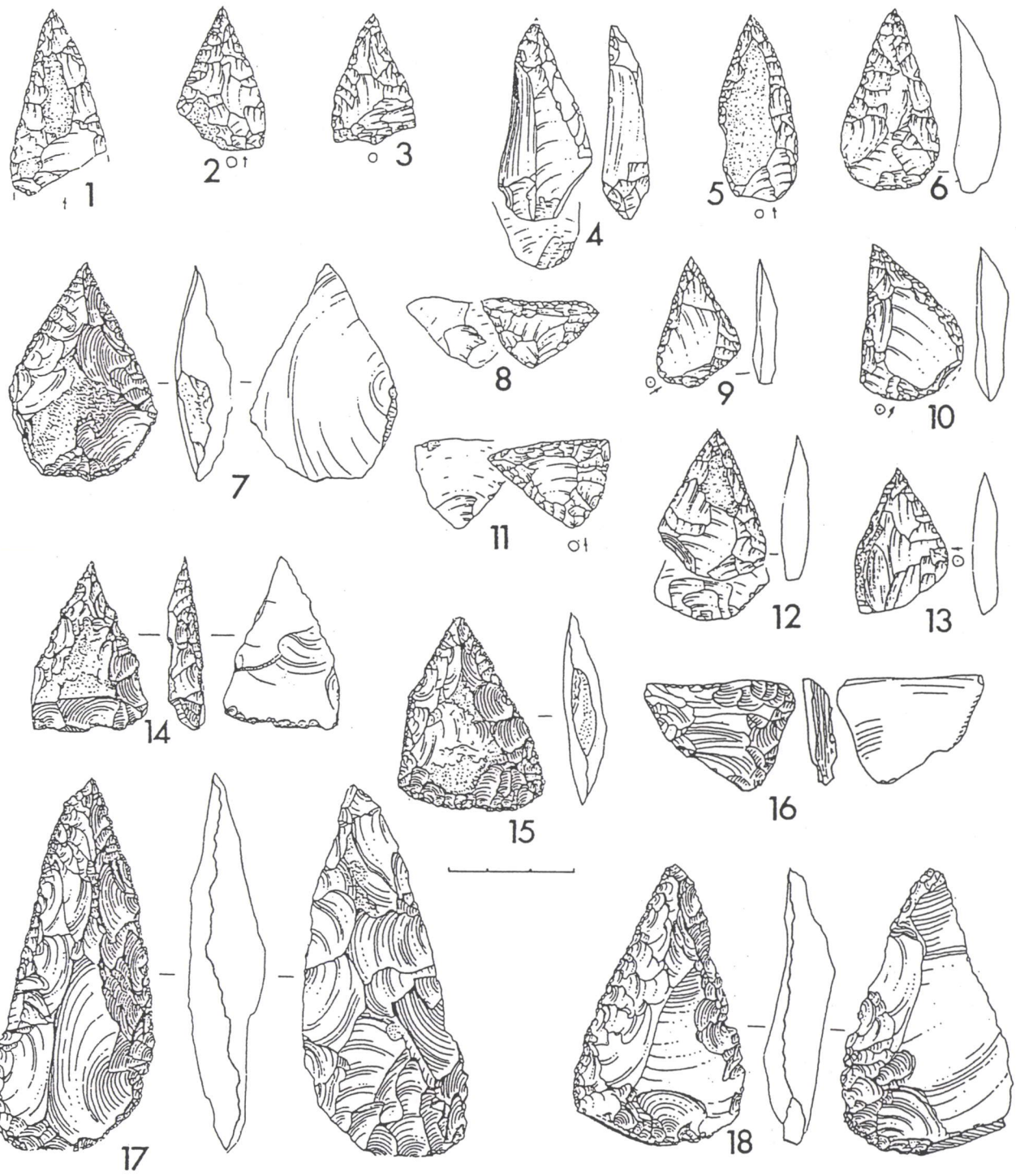


Figure 4.Tools of the Kiik-Koba (after Kolosov, Stepanchuk and Chabai 1993). (1-6, 8-13) Kiik-Koba, upper layer; (7, 14-18) Prolom I. Different shapes of unifacial (1-7, 9-10, 12-15) and bifacial (17-18) points. Chokurcha type scrapers (8, 11, 16).

Figure 5. Tools of the Staroselian. (1, 5, 7-8) Formosovís excavations at Starosele; (2-3, 6) Kabazi V, various layers; (4) Kabazi II, Unit I. Points (1) leaf shaped and (2 -3) crescent shaped : Scrapers (4) sub-trapezoidal, (5. 8) rectangular, leaf shaped (6)and (7) semi-trapezoidal.

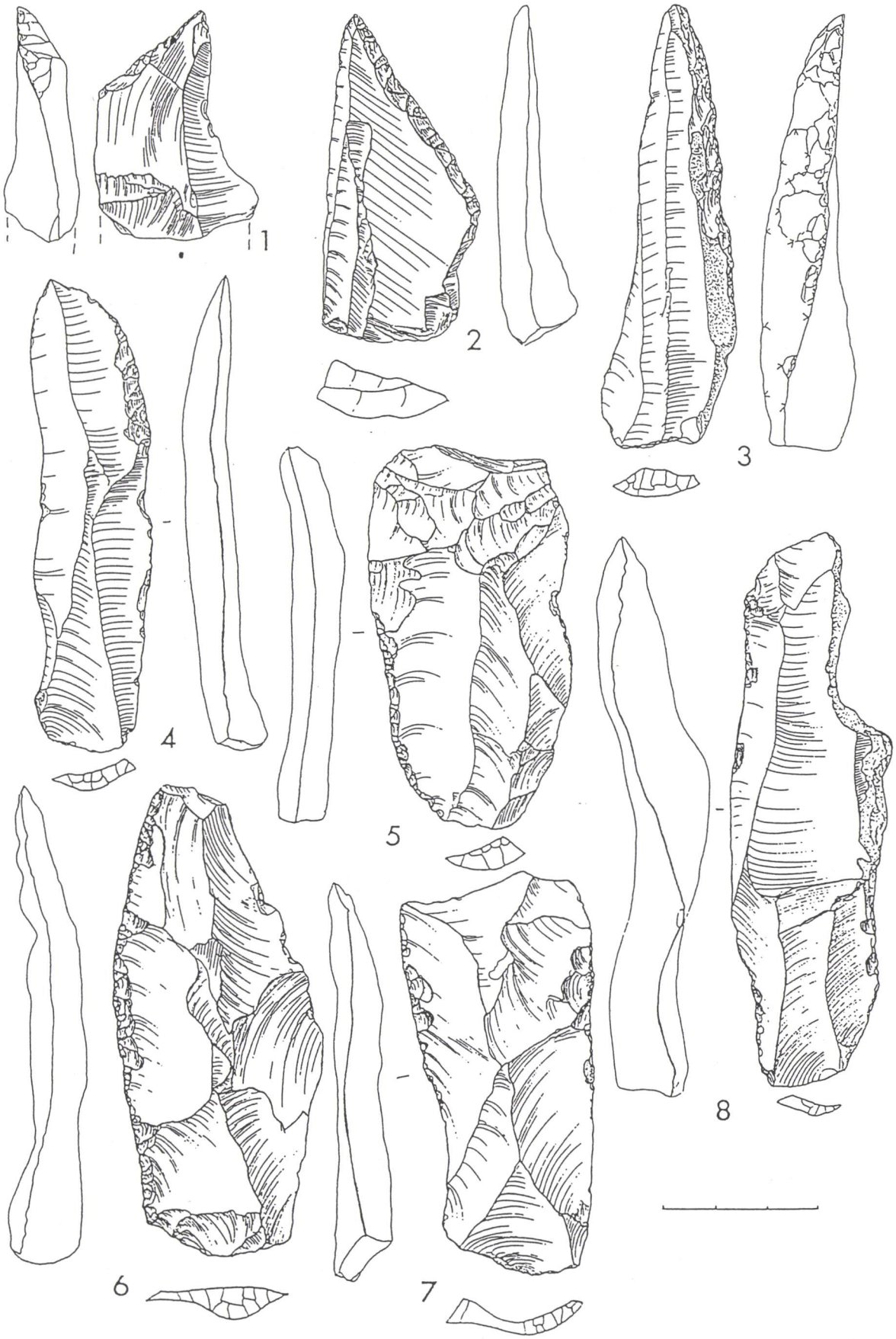


Figure 6. Tools of the Western Crimean Mousterian from Kabazi II, Unit II. Layer 1 (1-3); layer 5 (8); layer 6 (7); layer 7 (4-5); layer 8 (6). Obliquely truncated blades (1-2), backed point (3), sidescraper on blade (4) and on Levallois pieces (5-6); blade with light retouch (8), and double sidescraper on Levallois flake (7).

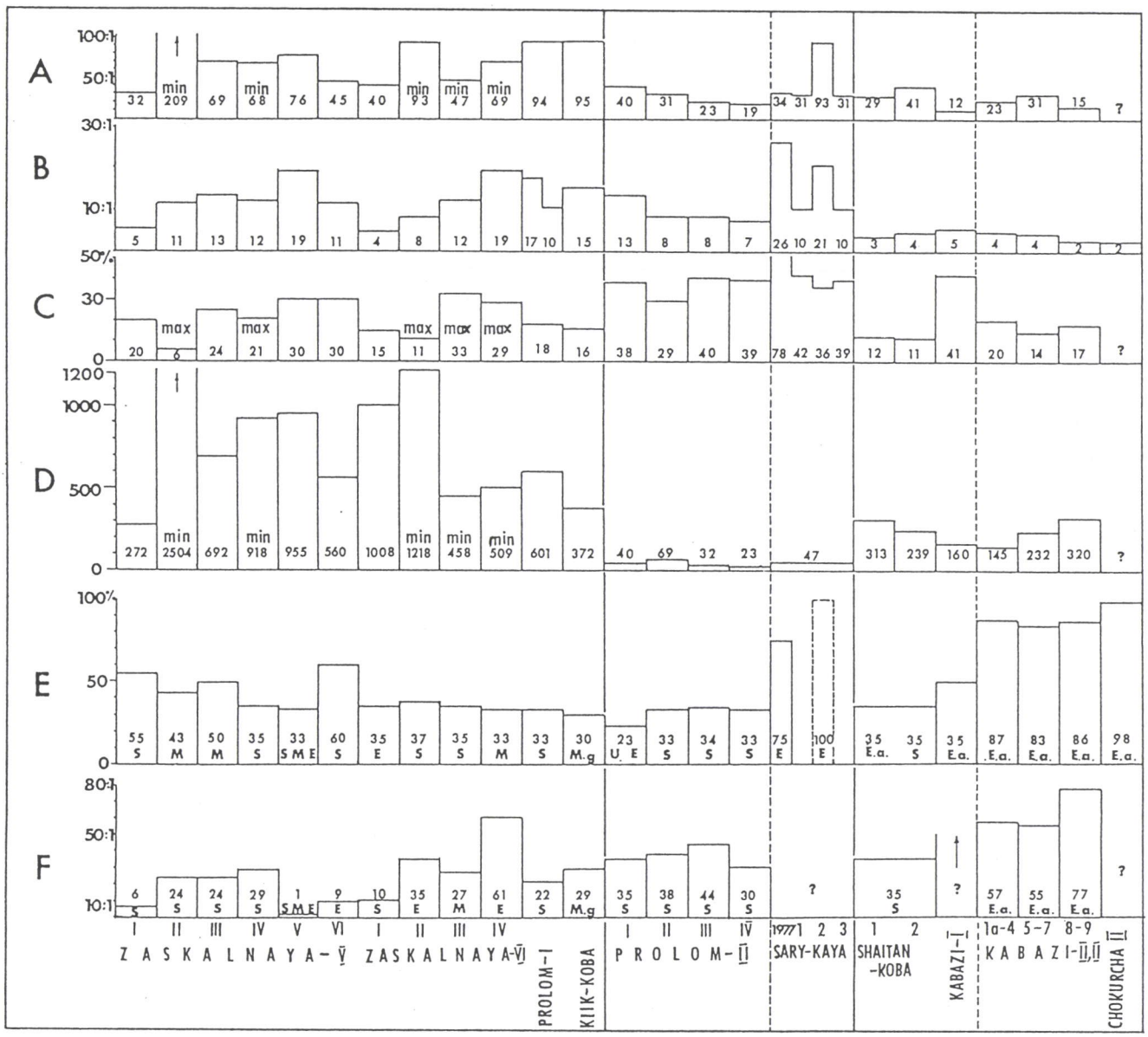


Figure 7. Lithic and faunal assemblage variability by occupation and industry. A - blank to core ratios; B - Unifacial tool to core ratios; C - percentage of tools in assemblage; D - artifact density per cubic meter; E - percentage of dominant species by assemblage; F - number of bones per MNI of dominant species. (Symbols: S, Saiga; M, mammoth; E, horse; M.g., *Megalocerus giganteus; E.a. Equus asinus hidruntinus; U. Ursus sp.).*