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CHRONOSTRATIGRAPHY OF ROCKSHELTER SKALISTIY: IMPLICATIONS FOR THE LATE GLACIAL OF THE CRIMEA

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INTRODUCTION

It is well known, that Late Glacial represents three successive cold stages: Dryas I-III separated by two temperate episodes - Bölling and Alleröd (17.000/16.000 - 10.300/10.000 unc. BP). European overview to Upper Paleolithic development in Late Glacial suggested particular features of both economy and technology relevance to hunter-gatherers communities (SONNEVILLE-BORDES D. de (dir.), 1979).

It is proposition of this article to investigate both the Late Glacial chronology and ecology in Crimea by various chronological methods: radiocarbon, sedimentology and palynology. This approach is issued from stratigraphical sequence of rockshelter Skalistiy, since it is unique available evidence of that kind in the Crimea.

As distinguished from both Middle Paleolithic and Mesolithic, Upper Paleolithic of the Crimea provided relatively not numerous quantity of sites (VEKILOVA, 1957; KOLOSOV *et al.*, 1991). Stratigraphical sequence of Siuren I, multi-layers sites Buran-Kaya III and open air site Vishennoye II are the most significant among them.

Current state of investigations is up to recognition of chronological terms of Crimean Upper Paleolithic. So, viewed from radiocarbon data, middle layer of Siuren I falls to Interstadial Stillfried B (OTTE *et al.*, in press). The broad sequence of Buran-Kaya III represents dispersed chronological episodes (YANEVICH, STEPANCHUK, in press). The assemblage from Vishennoye II hasn't chronological estimation yet. And, finally, rockshelter Skalistiy yielded uninterrupted sequence of the Late Glacial deposits (Dryas I-III).

SITES LOCATION AND HISTORY OF RESEARCHES

Rockshelter Skalistiy is located in South-Western Crimea inside Skalistoye village (province Bahchisaray). It is connected with lower part of lime kuesta on the right blank of Bodrak river (20 m above water level), in most narrow segment of the valley. This location belongs to External Mountainous area which extends maximum altitude near 350 m above sea level (Fig.1).

Some shelters with ephemeral evidences of Upper Paleolithic occupations can be registered in Bodrak valley (Shaitan-Koba II and Big Rockshelter) and open air workshop Skalistoye is one km far from Skalistiy rockshelter.

Valley of Bodrak intersects some different landscape systems: both Internal and External Mountaneous belts and part of foothills. It is worthy to note that site catchment area of Skalistiy seats fragments of all these structures. Nuclear area of Skalistiy joined with compressed area between foothills and Internal belt which provided ability shelters and water resources. So location of Skalistiy predicts

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three types of hunting strategy: control upon nomadic and settled ungulates, seeing site location is inside of passage between different types of grazing (External range and foothills); control upon narrow part of valley assuming hypothetical home ranges; application of various strategies depend on seasonal fluctuations of resources. The ability of row materials in the vicinity of Skalistiy can be seen as one of the most significant factor responsible for subsistence strategy.

Originally, the rockshelter consisted of two parts. In due course western section was distracted in consequence of both karst and rockfall processes (Fig.1). Cultural deposits of eastern part limited inside crescent shape ground (20 x 8-4 m2). Ancient slope was also distraught by human factor (Fig.2).

First investigations on this site were conducted by Yu.G.Kolosov in 1988-89 years. Excavation area (9 m2) registered stratigraphical sequence from seven cultural layers. Lower thickness of these deposits (I.VII-IV) was just tested (3 m2). Subsequently, excavations were conducted by V.Cohen during 1993-94 years. So, general investigated area comprises 36 m2. (Fig.2).

STRATIGRAPHY

The stratigraphical sequence of rockshelter Skalistiy has been testified through identification of lithostratigraphical horizons, cultural layers and cultural horizons. First feature is affected by lithostratigraphical hallmarks of deposits, second reflected accumulation of cultural remains inside each lithological thickness and, finally, third - spreading of real living floors.

Entirely, both constants and controls profiles enclosed whole stratigraphical sequence. However, boundaries of living floors distribution didn't coincided along vertical line. Sediments marked by high concentrations of human activity remains (ashy, flint, bones, etc...) had limited spatial distribution. So, western profile completely rebounded alternation of both lithological and cultural layers.

II.1. Western section (Fig.3)

- **Lithostratigraphical horizon (L.H.) (A)** - humus. It doesn't contain any cultural remains. Humus accumulated during last 20 years after destruction of early and middle Holocene deposits inside eastern part of rockshelter. For this reason the thickness with Bronze age cultural remains could be registered in the border of western part only.

- **L.H. (B)** - brown-gray deposits with strong concentration of small limestone pieces gravitated to modern slope. The boundary with underlying horizon represents one solid line. Some lithic materials of Kukrek Mesolithic culture were recorded in this thickness (" 0 " - cultural layer). Kukrek remains didn't structured within living floor whereby connected with ephemeral occupation. Hence, early Holocene age for L.H. (B) must be taken into account.

- **L.H. (C)** - rockfall horizon consisting of middle limestone blocks fallen from overhanging lime. Horizon restricted inside narrow strip (2-3 m) with location in parallel to bedrock.

I cultural layer (c.l.) recorded in the foot of rockfall and directly under the humus as well. Materials structured within one living floor.

- **L.H. (D)** - yellow-brown deposits of lime sand. Coloration arises to the modern slope direction. Horizon disseminated along excavation area exempt south edge. The upper boundary is clear; lower - not clarity in term of intrusive of sediments in underlying rockfall. Small limestones occurred only outside modern ground distribution.

II c.l. firmly connected with foot of this horizon.

- **L.H. (E)** consists of strong rockfall. Deposits subdivide into big/middle lime blokes and small lime pieces. Small fragments are missing between bedrock and modern drop line. The density of this horizon increases in south direction and admixtures as well as.

II c.l. gravitated to top of these deposits whereby provided two times occupation in the end of one and beginning of next climatic episodes.

Correspondingly to both stratigraphy and planigraphy data, accumulation of horizon (E) falls to comparatively broad chronological span (COHEN, 1994 a). Rockfall accumulation process provides two fluctuations at least : lower sub-horizon (aggregation of big blocks in south part of excavation area); upper sub-horizon (top of lithological thickness (E)). It spread along whole investigated area and outlying part of modern slope as well.

- **L.H. (F)** corresponded, basically, to yellow-gray lime sand. It contains several living floors of third cultural layer. It could be recognized in two stratigraphical positions: inside horizon (E) and directly under this last. Several ashy lenses were recorded there.

Cultural layer III - level 1 is underlying to upper horizon of rockfall (E). This structure consists of hearth and stonework around this object. The structure hasn't outlying area seeing all cultural remains were registered inside. As a distinguished from both III/3 and III/2 levels, hearths fillings include bones ash exclusively.

III/2 c.l. represents ashy lens between two horizons of rockfall (E). This lens sorrowed in southern loci, while finds had been dispersed along vertical concentration.

III/3 level contains similar ashy lens, although thick and coloration were more extensive. Visible colluviations responsible for postdepositional process were recognized on outlying area of this level, whereby it recorded ancient boundary between slope and drop line.

- **L.H. (G)** - third rockfall horizon consisting of big and middle lime stones. Horizon superposed limited concentrations of small lime pieces responsible for ancient streams water. So origin of rockfall process affected by increase of water erosion. Level (G) didn't provided any cultural remains.

- **L.H. (H)** - This thickness involved relatively homogenous aeolian sand with some features of soil origin. Viewed from distribution of thin rockfalls, several microfluctuations in the frames of the same climatic periods could be recorded. Both lack of small lime pieces within whole thickness and relatively homogenous character of sediment indicated unity of horizon (H). Forth cultural layers refered to this unite (IV-VII).

IV c.l. had lying directly under rockfall horizon (G) in upper part of thickness (H). V c.l. was separated of to ephemeral sterile level. Layer VI gravitated to initial rockfall concentration; and, finally, layer VII posed underlying position.

(H) horizon contained some clay admixture in the frames of south outlying area, which originated to outside of rockshelter.

- **L.H. (I)** consisted from humid gray sand without any features of rockfall. Archaeological remains were not represented here.

Thus depth of deposition sequence in Skalistiy extended six meters. It is obviously, that total thickness extended nine meters with estimation of distracted Holocene part.

II.2 Eastern section (Fig.4, 1)

- Lithostratigraphical horizon (A) is missing in this profile.

- **L.H. (B)** - brown-gray Holocene deposits with strong admixture of lime pieces. It doesn't represent along ground under overhanging lime.

- **L.H. (C)** - first rockfall. Profile registers both thick and admixture concentration in eastern direction.

- **L.H. (D)** - yellow-brown sediment is entirely same like described in western section exempt biggest quota lime pieces. Lower thickness contains remains of second cultural layer.

- **L.H. (E)** - second rockfall horizon. Eastern profile confirms precedes assumptions to this thickness. However eastern section registers more clear two sub-horizons divisions. Level III/1 doesn't spread along east part of site. Assemblage III/3 occurred between two sub-horizons of rockfall without any features of ashy lens structure what could be confirmed by planigraphical data as well as.

- **L.H. (F)** - sand deposits inside rockfall and directly under.

- **L.H. (G)** - third rockfall which provides less concentration here.

- **L.H. (H)** - has same character as in west section, although finds distribution from layer V were limited by brown - gray lens. Thickness of lens growth to the bedrock direction.

Both planigraphical and stratigraphical data registers variances in spatial distribution between l.II-III/3 and IV-VII. First group gravitated to west part of rockshelter; second to the east.

II.3 South section (Fig.4, 2)

This not complete profile represents cross-section of slope deposits. Hence first and second layers are not represented here. The beginning of sequence attaches to level III/3. Two rockfall horizons have a clear stratigraphical position: first connected with foot of rockfall (E), second identified with thickness (G).

Most of sediments within Skalistiy originated from inside rockshelter. These include sand, which is ultimately of aelian origin. Some clay sediments originated from outside whereby fall to ancient boundary between drop line and slope. The colluviation could have been responsible for deposition of the nonlaminated sediments were registered along slope. So, south part of excavation area coincided with ancient external part of rockshelter.

Additional sedimentary agent is associated with human activities and anthropogenic sedimentation. We have a clear idea of l.III/3 and III/2 occurrence, which provide surfaces of bones and particularly ashes and flints. Reason of particular coloration of layer V lens doesn't determine yet.

The sedimentation data assignments layers IV-VII to one climatic interval with several relatively temperate fluctuations in the bottom of these deposits.

RADIOCARBON EVIDENCES

All currently available radiocarbon data from Skalistiy sequence are suggested in the table (Tabl.1). It is worthy to note, that dates from layers III/3-I provide first radiocarbon results for Shankobien culture. Preceding chronology of this last was proposed accordingly to lithology, fauna and lithic data (COHEN, 1994).

Layers VII-IV were assigned to Upper Paleolithic viewed from stratigraphical position solely - under ancient Shankobien assemblage (COHEN, 1994a).

Viewed from radiocarbon data, layers VII-IV can be seen into affiliation of one limited and well defined chronological time span Dryas I. So dates confirmed lithological observations.

Upper and Final Paleolithic assemblages were disconnected of sterile deposit (rockfall (G)). Consequently, existing of chronological gap between them must be taken into account.

Dating of early Shankobien level yielded contradictions evidences. So, date (12.820 ± 140) falls to chronological frames of interstadial Bölling, while another test (11.750 ± 120) designates this level to the end of Dryas II - beginning of Alleröd. Somehow or other, stratigraphical sequence registed accumulation of level III/3 between both rockfall horizons, that, obviously, marked another climatic environment, more than probably - Dryas II.

Level III/2 has Alleröd date, what is completely agree with deposition structure. Superposed horizon doesn't teste by radiocarbon method yet. Layer II connects with both top of L.H. (E) (Alleröd) and foot of superposed layer (lime sand (D)).

Summarizing of these data leads to the conclusion that levels III/3 and III/2 existed in the frames of interstadial Alleröd. Layer II falls to Alleröd as well. Layer I can be seen into affiliation of Dryas III and, finally, layer " 0 " belongs to Preboreal time.

It is quite reasonable to suppose , that cultural deposits of Dryas I doesn't represent in sequences neither Siuren I nor Buran-Kaya III.

As it was suggested before, sediments of Skalistiy provided two measures of Alleröd thickness accumulation. It is noteworthy, those regions where Late Glacial succession is better defined, that deposits of Alleröd time usually subdivided into several spans: humid, temporally humid etc. (see, for example, ESCALON*et al.*, 1979; RENEAULT-MISKOWSKI, 1983). Probably, similar observations would be done for the Crimea.

IV. FAUNA

Excavations in rockshelter Skalistiy yielded numerous flint assemblages. Structures of cultural layers registered stable character of occupation. However, quantity of fauna materials must be estimated as not significant (Tabl.2).

Main part of collection connects with Shankobien layers (III/3 and III/2). Scarcity of fauna remains in Upper Paleolithic layers can't be appreciated viewed from idea about bad preservation, since microfauna remains were constantly represented in whole stratigraphical sequence. So, explanation of this fact connected with specification of subsistence activity.

Degree of materials preservation is not equal. Fauna from both levels III/3 and III/2 has errodive character, exempt small collection from pit (III/3) which has stony ceiling.

Each fauna assemblage provided Ovicaprines remains. In spite of limited possibilities for statistic method application, predominance of this specie must be took for granted. Remains of bos, red deer and saiga must be pronounced also.

Materials provided very fragmented bones, which could be assigned to category of " kitchen refuge ". Whereby, we are suggesting limited butchering activity for these sites. Obviously this practice took a place on the terrace of river or on the place of hunting.

V. MICROFAUNA

Microfauna data received through testifying of whole sequence inside modern ground. The results obtained submitted in the table (Tabl.3).

Fauna of small mammals from layer VII reflects predominance of mesophile landscape. Presence of *Clethrionomys Glareolus* remains confirms limited dissemination of loci forest. Steppe locks more than probably are connected with Plato viewed from presence of both *Ellobius* and *Citellus suslicus*.

Microfauna from l.V fully embedded to mesophile landscape similarly to microfauna character from l.VII (*Cricetus cricetus, Cricetulus sp., Misrotus arvalis*). Assemblage registered also presence of steppe (*Citellus suslicus*) and even semi-deserts loci (*Scirtopoda telum*). So, tendency toward xerophitisation of landscape must be recorded contrastly layer VII. Microfauna from l.VI confirms this observation. It could be characterized as transitional between l.VII and V in accordance with ecological outlook. Somehow or other, theriofauna from l.VI rebounded mesophile type of landscape evolution.

Remains of *Scirtopoda* and *Ellobius* in l.IV could be evaluated as indicators of semi-desert and desert environment. Viewed from these data, it seems that Crimean Late Glacial landscapes had visible bias to xerophitisation. Nevertheless, microfauna from l.IV concludes species of mesophile biotopes as well (*Microtus arvalis, Sorex minutus* and *Apodemus flavicollis*).

Scarcity of diagnostic materials in l.III/3-III/1 doesn't allows precise appraisal. At first sight, materials provide opened mesophile landscapes.

Much the same estimation issues from comparative analysis between microfauna from layer III and from Siuren II (VEKILOVA, 1971). In this last mesophile species (*Apodemius flavicollis*) dominated over steppe (*Cricetus eversmanni, Lagurus lagurus, Ellobius*). So, conditions of this fauna association were more temperate than Dryas II - Alleröd time span of Skalistiy layer III. Existence in Siuren II inhabitants of near

water biothopes (*Arvicola terrestris* and *Microtus economus*) may be treated as additional support of this fact. Relative chronology assignments both layers of Siuren II to Dryas III - Preboreal correspondingly (COHEN, 1995).

Suitable comparisons could be done for Skalistiy l.VII and Siuren I midl.l. (VEKILOVA, 1971). In this last species of open steppe area (*Marmota, Allartaginae, Ellobius, Sicista, Cricetus eversmunni*) dominated over both mesophile (*Apodemus flavicollis, Microtus arvalis*) and near water (*Microtus oeconomus*) biotopes. Paleogeographical peculiarities between both assemblages obviously affected by chronological distinctions. Radiocarbon datations support this conclusion.

There are not doubt that palaecological study of Crimean Late Glacial viewed from Skalistiy microfauna is only first approach to this subject. Nevertheless, two estimations could be done: 1) under predominance of mesophile landscape, comprehensive tendency to xerophitisation must be noted; 2) subordinate position of forest indicators in Alleröd assemblages looks like surprise which waiting for explanations in additional testes.

VI. PALYNOLOGY (TENTATIVE APPROACH)

Pollen samples were taken from the limited section of the western part of the sites in 1992. The complete genetic profile forms of the Holocene soil is not represented at the described section. Only the redeposited Holocene sediment (A) has been observed. The last one demonstrates a type of pollen spectra quite different than that of the layer C related to Dryas 3. The deference consist in a very low frequency of pollen, more low value of arboreous pollen (AP) and more high value of non arboreous pollen (NAP), more poor composition of AP at the DR 3 deposits.

The DR 3 pollen spectrum is of the forest-steppe type, with low amount of xeric grasses (*Artemisia, Chenopodiaceae*). So, the vegetation of the Crimean mountains differed from the vegetational cover of the plain territory of Ukraine. Steppe communities were predominant at the Dryas 3 including dry steppes in the Eastern Ukraine (GERASIMENKO, 1995; ISAEVA-PETROVA, 1976). Some spread of xeric grasses have been fixed even for the territory of the present forest zone in the northern part of Ukraine (BEZUS'KO*et al.*, 1988).

Pinus is more frequent in AP. The other single pollen grains belongs to the boreal floristic complex. Absence of broad-leaved taxa gives evidence of rather severe climate. The finding of *Corylus* pollen that usually hard-wood deciduous taxa indicates the possible preservation of the last ones in the protected refuges only. Herbetum mixtum is predominant in NAP. It is mainly represented by *Asteraceae* including xerophytes as well as plants of the disturbed grounds. The taxa of cryophites typical for the DR 3 sequence of the Russian plain is not characteristic of the studied section. Spores are represented by *Bryales* and single *Lycopodiaceae* only. The data allow to suppose the boreal meadow-forest vegetation spread in the Crimean mountains at the Dryas III. At the same time, Belorus and the northern part of the Russian plain were occupied by periglacial forest-steppes with high share of shrub birches and *Artemisia* sect. Seriphidium while, the Don river basin was covered by xerohalophytes steppes. Pinus growth was near the extremal boundary of its natural range there (BORISOVA, ZELINSON, 1995; ElOVICHEVA *et al.*, 1988; BEZUS'KO *et al.*, 1988; SPIRIDONOVA, 1991).

Palynospectra of deposits of the layer (D) are similar and have been united in the pollen complex. The last one is some more rich in pollen especially in AP than the Dryas III spectrum. It includes spectra of the meadow-forest type as well as the Dryas III one but with more diverse AP composition. Boreal taxa dominated (*Pinus, Alnus, Salix, Picea, Betula*) but pollen of broad-leaved species also occurred including *Fagus, Carpinus, Quercus, Ulmus, Tilia.* The number of *Corylus* pollen increases as well as of other shrubs (*Rhamnaceae, Caprifoliaceae, Rosaceae*). It is supposed that *Corylus* and broad-leaves taxa spread from the refuges at this time span and reached the locality of Skalistiy rockshelter. At the sequence, the c.l. II (D) is only one being characterized by the presence of *Picea* pollen. It is evidently not occasional fact because the stratigraphical position of the layer has been

related to the Alleröd. The last one is characterized by the maximum spread of Picea at the Russian plain (BEZUS'KO*et al..*, 1988; ELOVICHEVA*et al. .*, 1988; SPIRIDONOVA, 1991; GERASIMENKO, 1993, 1995; BORISOVA, ZELIKSON, 1995). In the flood-plain near the studied locality, alder thickets (*Alnus glutinosa Gaerth*) alternated with meadow communities. *Polypodiaceae, Lycopodiaceae, Cyperacea,* mezophilic Herbetum mixtum became prominent while xerophytes were not represented. The vegetation cover of the Alleröd seems to reflects the existence of more humid and cool climatic conditions than those of the Holocene. It is well correlated with reconstructions of the vegetation of the Russian plain at the Alleröd: Pine-Betula open forests and meadow steppes in the Donetsk highland, *Pinus-Picea* forests with the admixture of broad-leaved taxa in Belorus and the northern Ukraine, Spaise Picea forests in the center of the Russian plain (BEZUS'KO*et al. .*, 1988; ELOVICHEVA*et al.*, 1988; SPIRIDONOVA, 1991; GERASIMENKO, 1993, 1995; BORISOVA, ZELIKSON, 1995). In the pollen spectra of the Alleröd deposits from the Western Rodopy, Pinus, Betula, Cupressaceae occur along with *Quercus* (some species), *Caprinus betulus, Caprinus orientalis, Tilia, Ulmus, Fagus, Taxus, Ostrya, Vitis* and *Cornus* (HITTUNEN A., HITTUNEN R., 1992). These spectra seem to be rather similar to the Crimean ones.

The underlying deposits (L.H. E - inside the second fall) contain three microfossils only: *Pinus, Cyperaceae, Bryales.*

Radiocarbon evidences from levels III/2 and III/3 indicate the Early Alleröd age though another date shows the beginning of Bölling. In any case, the pollen spectra documented more cool climatic conditions than those of the time span related to c.l. II (lower value of AP, more poor composition of AP). *Pinus* is more frequent then *Corylus* and *Rhamnaceae* follow. Only single pollen of broad-leaved taxa (*Quercus, Tilia*) has been found. Within the deposits of cultural layer III, the level III/2 is likely to coincide with some climatic amelioration but not so pronounced as one of the II level interval. The pollens of representatives of nemoral flora (*Carpinus, Fagus*) are absent in the III layer deposits. This fact as well as lower value of *Alnus, Cyperaceae, Lycopodiaceae* and higher values of *Asteraceae, Chenopodiaceae* give evidence of not only more cool, but more dry climatic conditions than those of the II layer interval. At the same time, climate seems to be milder than that of the Dryas 3. Pollen data from France and Latvia (TENSORER, 1981; STELL*et al. .*, 1987) indicate the complex structure of the Alleröd deposits reflecting two moderate-warm climatic optima with more cold interval between them. Judging from 14C data, we can supposedly relates the layers II and III/2 to the optima while the level III/I to the cool Alleröd phase and level III/3 to the Dryas 2-Alleröd transition.

The underlying fall horizon (C) yielded 8 pollen grains only. So, there are not evidences for some environment reconstruction. Only *Pinus* and *Cupressaceae* are represented in AP.

According to the author of the excavation, IV and V cultural layers are enclosed in the same lithological horizon dated by 14C to the Dryas I. Pollen data though being scanty, allow some preliminary assumption on the gradual climate shift from the beginning to the end of the corresponding time span. Pollen spectra of this interval are representative of the boreal-meadow-forest vegetation. The beginning of the interval was characterized by more severe climatic conditions (only 4 arboreous taxa, *Pinus* dominated) while some increase of *Corylus* pollen, more diverse AP composition as well as increase of *Alnus, Cyperaceae,* meadow species *Potentilla arvensis L.* and especially of spores including *Polypodiaceae* indicate some growth of climatic amelioration at the level of the IV cultural layer. It looks like a slight amelioration of climate to the end of the stage though the climate remains more cold than that one during the formation of the cultural layers II and III. This very locality climatic conditions of the Dryas 1 were evidently more humid than those of the Dryas 3. Broad-leaved taxa sporadically persisted in the protected refuges (a single finding of the well preserved Carpinus pollen).

The deposits including VI cultural layer yielded 14C data about 15000 BP. But the corresponding pollen complex indicates rather interstadial conditions. AP values are maximum for the sequence while NAP-minimum. AP composition is diverse including

broad-leaved taxa (*Tilia* and single *Quercus, Ulmus, Acer*, even *Fagus*). *Corylus* and *Alnus* are noticeable but *Pinus* dominated. *Salix, Caprifoliaceae,* arboreous *Rosaceae* pollen have been observed as well. Mesophilic Herbetum mixtum prevails in NAP. Judging from pollen data, the climatic conditions were more cool than those of the Holocene and the late Alleröd optimum but rather humid. Some spread of broad-leaved taxa from the refuges took place, alder grew in valleys. Evidently we can correlate this interstadial with the substage of climatic amelioration fixed by the fossil soil subhorizon within the last loess horizon of the Upper Pleistocene on the South-Ukrainian lowland. This is so-called Sredneprichernomorskiy subhorizon dated to about 15000 BP (VEKLICH*et al.*, 1993). By pollen data (SIRENKO, TURLO, 1986), *Pinus* and *Betula* with the admixture of *Quercus, Ulmus, Tilia* and *Carpinus*, grew in the river valleys of the Dnieper and Dniester at this time span. It shows close parallel with the studied sequence.

The pollen spectra of the VII cultural layer are representative of the forest-meadow vegetation. AP value are lower, NAP value are higher and AP composition is less diverse than at the level of the VI cultural layer. The last one is more rich in broad-leaved taxa while the described level yields single pollen grains of *Caprinus, Quercus* and *Tilia*. These data indicate more cool and less humid climate than that of the VI cultural layer interval. But we can notice that more poor AP composition is characteristic of the upper part of the layer. Even *Corylus* pollens are absent there.

In the sequence, the most low value of AP (18%) is registered at the stratigraphical horizon I. Only *Pinus* and *Betula* are represented. Xerophites (*Artemisia, Chenopodiaceae*) and *Asteraceae* are notable in NAP. *Polypodiaceae, Lycopodiaceae* have not been observed. The data give evidence of the most severe climatic conditions during the studied time span. The reduction of forest area is evident, the landscapes are dominated by meadow.

VII. INDUSTRIES

Through study of flint assemblages from rockshelter Skalistiy is apart from this paper. So we shall try to examine only main features including correlation between different techno-morfological groups. The data would be applicated for both general chronology and settlement pattern.

VII.1. Flint procurement

All assemblages of Skalistiy accommodate utilization of the same row materials, which subdivided into three main components: outcrops of high quality materials is one km far from site (big pieces and plates as well); relatively bad quality nodules selected along slopes of valley (small pieces) and lithic originated from Middle Paleolithic sites (so called reutilized flint).

Each assemblage contains complete stuff of these categories. However item quota fluctuated by in virtue of each site function. So, levels III/3 - III/1 yielde 95% of first group row materials. In that time, Upper Paleolithic layers contain 20-25% of row materials originated to both slopes and ancient sites.

Yu.G.Kolosov testified surface of outcrop in 1988-89 years. The excavations registered some workshops (Skalistoye), which were assigned to Upper Paleolithic (KOLOSOV*et al.*, 1990). However, cores from workshops provided both volumetric and semi-volumetric reductions, that characterize Shankobien knapping technology.

Thus, as a distinguished from Upper Paleolithic, Shankobien toolmakers used both nodules and preforms.

Analyze of cores front and retouched pieces shows that lithic production of all layers embody different shapes and weight strong hammers exclusively (Fig.5).

Layer VII

This assemblage provideds relatively small quantity of finds (141) originated from limited area (6 m2). Group of cores is restrictes at two specimens: bipolar core (composition of volumetric and unvolumetric reductions) and preform. Flakes are dominated among debitage products (Tabl.4). Cortical flakes are numerous (7, 8%). In contrast to superposed layers, this industry supplys majority of regular and reduced blades. No curved blades of this industry are

apart from Dufour technique. Small flakes (till 2 sm.) are predominated over other. It is worthy to note the lack of cores resharpening removals and high quota of chips. Secondary retouching represents only one core shape endscraper.

Layer VI

This assemblage comprises big quantity of finds (3295). Cores (0, 4%) subdivided into preforms (9), cores with two striking platforms (2) and with one striking platform (10) (Tabl.4). This last group provides unvolumetric prismatic cores and slight quota of narrow flake surfaces cores. Low angle cores must be also pronounced. In the majority cases, cores are completely utilized. Main part of preforms represents first stage of decorticating.

It is worthy to note the visible quota of small nodules (0, 7%), crested blades (1, 1%) and other types of resharpening spells (tablets, diagonals etc... - 0, 9%). Both high degree of cores utilization and resharpening spells record careful output of row materials what is contrasted with Shankobien style of primary retouching.

Flakes are main category of debitage products (40, 2%) and cortical pieces (10, 5%). In fact, large flakes are missing, and metrical standard seats in the frames of 1, 5-1, 7 sm. Not regular broken blades compose 95%. High quota of chips (15, 5%) are connected with both primary and secondary retouching.

Wholly, knapping technique may be treated as flak-blade retouching. All pieces have reduced sizes in spite of blades or flakes character.

Secondary retouching provides both retouch and burins blow technique. Majority of tools have limited retouched fronts: retouched blades, flakes and endscrapers. Steep retouched pieces embrace backed blades (5%), truncated blades (11%) and some backed knifes.

Retouched flakes are dominated amongst tools (21%). Majority of endscrapers performe on flakes (Tabl.5). Some core-shaped endscrapers could be distinguished from other endscrapers of this assemblage (Fig.6, 22).

Geometrical microliths are not represented in layer VI. Not geometrical points are predominated over other (8%). Unique backed point with truncated base can be noted in the group of geometrical point.

Common typological features of layer VI can be estimated as follows: 1) knapping technique is apt to unvolumetric retouching; 2) reduced size of both blanks and tools; 3) visible quota of " Epigravettian " component: backed blades and truncated pieces; 4) presence of limited component of Aurignacian tradition (core-shape endscrapers) attached to totally lack of " Dufour " technique: Dufour blades with curbed profile.

Layer V

This assemblage is mostly numerous then underlying (4090). It is noteworthy, that quota of cores preserves, but quantity of tools has a tendency to rise (5%) (Tabl.4).

Cores subdivide into three technological categories: with one striking platform, with two striking platforms and preforms (majority). Cores with one striking platform are the same like before: prismatic unvolumetric, low angle cores and those with narrow flake surface. Both resharpening removals and crested blades affirm the visible series (Tabl.4). Some flakes with finch fractures and two bulbs of percussion can be recorded among usual resharpening spells.

Flakes (36, 4%) and cortical flakes (7, 3%) altogether are main category of debitage products. Small pieces (till 1, 5 sm.) are predominated among them. All blades have reduced sizes and 90% were broken as well. As a distinguished from layer VI, group of microblades provided exclusively atypical pieces. Dufour blades are missing. The enormous quota of chips draw the attention (19, 4%).

We can't escape the conclusion, that main part of retouched pieces were used apart of this assemblage. Quantitative disagreements between both group of tools and debitage products testify this hypothesis (Tabl.4, 5). Small part of retouched pieces has final morphological character, what also supports this idea.

The restructuration of quantitative division of tool kit must be taken into account. So quantity of retouched blades extends to 19% while retouched flakes are main category of tools (33%) (Tabl.5). Flakes/blades stylistic features are entirely the same that in assemblage of layer VI.

Endscrapers (5%) have more burins (3, 4%). Flake endscrapers predominate over other. It is worthy to note the first occurrence of short " nail " endscrapers in the assemblage of layer V within this sequence.

Both backed blades (3, 9%) and truncated pieces (20%) compose characters types of this industry. Several backed blades have truncation or flat ventral retouches (Fig.6, 18, 19). Certain backed blades (6) have one side blue patina and, probably, are connected with the same projectile point.

First occurrence of geometrical microlits (isosceles triangles) were detected to layer V, associated with one curved backed point (Fig.6, 16). Usually same pieces were testified in creswell, federmesser or tjongern cultural context. It seems likely that these implements can be estimated as proto-arched bipoints of Shankobien culture. Concerning the structure of points group, ungeometrical pieces are totally dominated over others (7, 4%). This group includes eleven oblique retouched points and microgravette as well.

This industry provides one cross-section with flat inverse retouches - armature of kukrek's type. As a rule, these pieces fall to Kukrek technocomplex of Early Holocene of both Steppes and Crimea, although several same armatures were found in assemblage of Upper Paleolithic site Anetovka (STANKO *et al.*, 1989). However, the necessity to distinguish typological and functional aspects in estimation of Kukrek armatures had been suggested (SAPOZNIKOV, SAPOZNIKOVA, 1992). More than probably, that " Kukrek " armature from Skalistiy hasn't any cultural context.

The industry of layer V has entirely similar techno-typological character to underlying assemblage: flake-blade knapping technique, small size of tools, notable backed component, limited evidences of Aurignacian tradition and lack of Dufour technology. Possibly, the changes in quantity stuff are due to chronological development.

Layer IV

As far as we can see, the assemblage of layer IV take a particular place in the Skalistiy sequence relevance to the problem of Shankobien origin, first of all.

The quantity of finds allows correct statistical estimation (Tabl.4). Cores subdivide into two groups: with one striking platform and preforms. Unvolumetric and semivolumetric reductions must be recorded in this assemblage. It is worthy to note, comparatively, not numerous quantity of resharpening removals and crested blades. Majority of blades are not regular and reduced.

The secondary retouching provides retouch and burin spell techniques. The quantity of tools increasing as well as quota of blades worked tools relevance to each group (endscrapers, burins, points). Both notable lack of backed blades and decrease of truncated pieces must be noted. At the same time industry of layer IV supplies the first Shankobien geometrical pieces: several crescents, Azilian arched bipoints and one trapeze-like point (Fig.6, 12-14).

As it was described before, the layer IV and the early Shankobien level III/3 were separated by sterile rockfall horizon. This fact limits the possibility for microlithes intrusive from overhanging layer. Furthermore, two crescents were found together with debitage products responsible for its perfomance.

The secondary retouching of this assemblage represents much the same stylistic features like l.VI and V in the frames of identical system of flint procurement.

It is quite reasonable to suppose that the occurrence of geometrical tools in this industry were due to direct typological succession. Hence, the assemblages of l.VII-IV can be seen into affiliation of the same cultural tradition.

Shankobien assemblages

Viewed from typological data, the assemblages of l. III/3-I provide development of one cultural tradition.

Level III/3 yields most numerous collection (30000 pieces). The materials are subdivided into three groups (Tabl.4, 5). First one (III-1988, 89) comprise findings from excavations by Yu.G.Kolosov seeing microstratigraphical divisions, is not done in this study. Small assemblage " III/3 - pit " originates from food storage structure in the central area of ashy lens. So, the combined data totally reflects the typological spectrum of level III/3. However, the quantitative correlation must be taken into account accordingly to materials from the 1993-1994 years excavations.

The cores subdivide into prismatic with one striking platform (majority), with two and three striking platforms; radial cores and preforms. The most of nodules are originated from outcrops, however the quota of reutilized pieces is visible too. The careless expenditure of row materials is a constant feature of this industry, since the majority of cores displays initial stages of utilization. The level contains lot of debitage products as well (Tabl.4).

The cores with one striking platform represent unvolumetric, semivolumetric and volumetric reduction. Core with narrow flake surface could be noted. Occurance of volumetric reduction is apt to stretching of cores front under conditions of strong hammer application. This group hasn't constant morphology attached to a slight degree utilization of cores. Thus the predominance of cores with one striking platform envisages three explanations: 1) the orientation of this industry to large blades; 2) the ability of row materials and, finally, 3) the limited typological character of retouching instruments.

The volumetric reduction provides subconical, conical and pyramidal cores. Shaping process is connected with the last stage utilization of cores, therefore these types are employed for microblade production. Viewed from analyses of resharpening removals, the origin of subconical and conical cores is affected by resharpening process.

The cores with two striking platforms are more representative than in underlying layers. Viewed from technological features, it's subdivided into two categories: 1) with formed working surface and 2) both primary and secondary preformes, where additional second platform is employed exclusively for knapping aims.

Contrasting with l.VII-IV, this industry adoptes big and middle size nodules in accordance with typometry of cortical spells, resharpening removals and crested blades.

The flakes are the main category of debitage products of this industry. The blades (18%) have direct profiles and subparalell edges.

The secondary retouching includes retouch, burins spell technique and scaled pieces.

The first occurrence of the microburin technique must be recorded. However the majority of geometrical pieces were performed with an usual break on the part of notch on the distal should.

As distinguished from the assemblages described above, the retouched blades are the main category of tools. In the whole quantity of blades, worked tools extend 20%, that allows to assignees this assemblage to blade industry (Tabl.5).

A notable lack of backed blades must be registered. The various retouch technique (semiabrupt, abrupt, notched) characterizes this assemblage.

The quantity of endscrapers rises relevance to burins as the prolongation of the Upper Paleolithic succession. Flake endscrapers (as well turbnails), blade endscrapers and core shape implements are registered in this industry. The group of burins represents typological variety: burins on truncation, flat burins, dihedral, noalles burins, etc...

Both high quota geometrical points and its topological diversity are character features of Shankobien industry (9-13%) (BIBIKOV*et al.*, 1994). The typological structure of l.III/3 completely confirmes this data. Azilian arched and trapezes like

bipoints are most numerous (Fig.6, 8-10). Other types of geometrical points must be noted too: narrow points with high backs (lunates), cheddar-creswell points, bicurved (Protosauveterre), convergent, with angle backs, micrograveltes, pseudozarzi, three sides retouched triangular points, unipoints with curved back (federmesser-tjongern). In the majority of the cases, these types provide uniqe implements or small series.

All pieces represent are different versions of Azilian points (see CELERIER, 1979), exempt some micrograveltes or " Istr " points and protosauveterre. It is worthy to note that points with specialized hufting modifications (tangs, shoulders) are almost missing in this industry.

Among geometrical microliths, crescents and trapezes dominate over others. Some of them have additional burins spells.

This assemblage may be entirely treated as a blade industry with evolved and various geometrical components with a slight quota of other backed evidences (backed blades, rectangles, gravette and micrograveltte points).

The assemblage of l.III/2 represents the next stage of Shankobien succession. The flint procurement is also firmly connected with outcrops. So, two nodules originated from slopes among 23 pieces. The cores with unvolumetric reduction dominate over others. The bipolar cores represent the main category of cores with two striking platforms. The blades/flakes quantity correlation is the same that in the level III/2 (Tabl.4).

The majority of nodules, preformes, cortical flakes and other debitage products were found in the south outlying area of the ashy lens distribution. Both, utilized cores and products of secondary retouching, concentrate in the central area. It is noteworthy that the main part of the regular blades are connected with central loci too, what offered selection of blade activity to the knapping method.

The retouched blades are the leading category of tools (Tabl.5). The majority of endscrapers has broken fronts. This fact reflects tools activity in the frame of living floor like the presence of multifaceted burins.

The typological structure of both endscrapers and burins is practically the same while in l.III/3. All other things being an equal category of points consist of geometrical implements where both arched and truncated bipoints are predominated. The common estimation of this industry defines the limitation of typological spectrum group of points and visible microlithisation of geometrical components.

The assemblage of III/1 level is relatively not numerous (741) and, yieldes wholly the same typological evidences, although prevalence of volumetric reduction and notable lack of geometrical tools must be recorded. There are no doubts that these changes are not due to any cultural shifts. Obviously, these data reflect the fluctuations in the settlement pattern of a same cultural group (see below).

The industry of l.II can be estimated viewed from numerous and representative collection (6185 sp.). So the cores subdivided into several groups: with one and two striking platforms and preforms (Tabl.4). The unvolumetric cores with one striking platform are most numerous. The broad series of nodules and preforms confirme the existing of working treatment full cycle on this site. The growth of flakes taxa (60%) attracts the attention. The majority of preforms and primary debitage products were found on outlying area attached to the ancient slope. Most part of used cores and retouched pieces aggregated around hearths and the secondary debitage products gravitated to these loci too. So, the spatial structure of lithic envisages both tools production and utilization on the same location - inside ancient ground.

The endscrapers (13%) are predominated over burins. The group of endscrapers yields an usual Shankobien structure (composition of blade endscrapers and short flake endscrapers). The group of points (18, 1%) consists of geometrical and not geometrical pieces. Both zonovien points with simple oblique truncation and convergent forms are predominated among these last. The Azilian arched bipoints and the trapezes like points take a leading place within geometrical pieces of this industry (Fig.6, 1-6). The lunates and the micrograveltes are despaired on this stage.

The crescents are predominated over other geometrical microlithes (6, 3%). Several high trapezes can be recorded also (Tabl.5).

The industry of l.I represents some changes relatively to Shankobien assemblage. First of all, this assemblage records growth of the bipolar reduction. The group of points contains exclusively ungeometrical pieces in view of a general microlithisation and reducing of sizes of geometrical tools. These last represent crescents or small arched bipoints. The trapezes are missing.

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Viewed from techno-typological outlook, the stratigraphical sequence of rockshelter Skalistiy could be subdivided into forth taxonomic groups: 1. Upper Paleolithic (l.VII-V), 2. Final Paleolithic (l.III/3-1), 3. Transitional assemblage (l.IV) and 4. Mesolithic (l.0). The analyses of data allows to outline the main typological features of each of them.

The Upper Paleolithic group, including l.IV, provides flakes-blades industries without any feature of Dufour technique. The Final Paleolithic assemblages are directly linked with blade technique evolution.

The changes in quantity/quality of blades must be defined with the assistance of gestogrammes (Fig.7). So, the blades with large (0, 9-1, 5 sm. - second group) predominate in all assemblages. However, the second position belongs to microblades in Upper Paleolithic assemblages while the Shankobien data supply the third group of blades (1, 5-2 sm.). Consequently, the grown of blade technique accompanied by extending of blanks spectrum (l.VI-IV) and transference of selection of blades to largess blanks (l.IV-I). It is quite reasonable to suppose that the technological changes are due to necessity to product different types of blanks for geometrical points and microliths. In the final analysis, it is directly linked with development of archery weapons. Both, typometry and comparisons data, register the evolutionary character of these changes. The prevalence of blades of second group in the assemblages provide a notable lack of geometrical microlithes (l.VI and III/I).

Another importance bias issue from replacement of backed blades to geometrical group (l.IV), while the data analyze registers the coexistence of both in l.V.

It is common assessing that the archery weapons replace dart and altatl in the Late Glacial period (ROZOY, 1990; BERGMAN, 1993). Viewed from numerous data thy backed blades are armatures of organic projectile points. Some micro-wear testes assign the Azilian points to bow and arrow equipment (CELERIER, MOSS, 1983). So, probably, the occurrence of both points with truncated base and curved backed points in l.VI and V is affected by the utilization of bow and arrow. Hence this type of weapons was well know in this time. The backed blades are not character features of the Shankobien industry (COHEN, 1994). So, the final choice of archery weapons was done before the occurrence of Shankobien culture.

Rockshelter Skalistiy encloses a rare Shankobien succession, which allows to investigate this phenomena through a long term evolution. It is worthy to note, that reducing of typological spectrum from lower to upper horizon (III/3-I) and widespread of microlitisation as well.

VIII. CULTURAL DETERMINATION

Viewed from modern data, Crimean Upper Paleolithic embraces broad chronological span. It becomes clear that the chronological sequence of Siuren I doesn't provide Final Paleolithic deposits as distinguished from standpoint represented before (VEKILOVA, 1971, p.141; ROGACHEV, ANIKOVICH, 1984, p.179). This conclusion is issue from radiocarbon data of Siuren I (mid.l.) and palaeontological evidences from upper layer of this site.

The dating of Siuren I (up.l.) represents the most complicate question on the modern stage of investigations. The available estimations suggest a wide chronological framework for this assemblage: XVI-VIII mil. BC (ROGACHEV, ANIKOVICH, 1984) or XV-XIII mil. BC (BORDES, 1968). E.A.Vekilova argues that upper layer is

underlying to Early Holocene viewed from the presence of temperate fauna (1971). However, the presence of cold fauna species (deer giant and arctic fox) registers nearly the ancient age, seemingly these both are missing in Late Glacial sequences of Crimea and within Mediterranean area as well (BIBIKOV*et al.*, 1994, tabl.24 a). The comparison analyze of microfauna between lower layer of Skalistiy and upper layer of Siuren I confirmes this idea also (see above). These data allows to offer that Siuren I (up.l.) is dated whether end of maximum ice cold or initial Dryas I. This last chronological horizon is connected with upper part of dumb thickness (I) in Rockshelter Skalistiy.

The investigators of Siuren I have constantly concentrated attention on typological succession within Siuren I sequence whether like three stages of Aurignacian evolution (BONCH-OSMOLOWSKI, 1934) or three stages of homogenous cultural development (VEKILOVA, 1957, p.317). Nevertheless typological evidences supplied by them must be seen into affiliation of two different cultural traditions at least. So, both Lower and Middle unites of Siuren I fall to Aurignacian technokomplex (BONCH-OSMOLOWSKI, 1934; OTTE*et al.*, - in press). Viewed from typological and chronological hallmarks these entities can be seen into affiliation of same archaeological phenomena " Lower Siuren culture ".

It is worthy to note the visible changes in typology, and quantitative combination in the middle layer toolkit. So endscrapers predominate over others. The quantity of strength dihedral and multiple burins increases. The reducing of microtools amount (15%) and the increasing of fine retouched Dufour blades must be noted. The Dufour blades take a leading place among inserts. The main change in this industry firmly connected with slight quota of backed blades. Hence, both stratigraphical and typological data offer two-stages periodization of Lower Siuren culture.

The industry of the upper layer contains some Aurignacian features: core shape endscrapers. However, the visible changes of knapping technique is affected by the retreat of Dufour technology. The principal type of armatures is the backed blade in association with the slight geometrical microliths (crescents and rectangles). Thus, assemblage represents a completely different cultural phenomena, which could be named " Upper Siuren culture ".

The Upper Paleolithic assemblages of rockshelter Skalistiy (l.VII-V) are similar to those Siuren I (up.l.): lack of Dufour blades, small sizes of retouched pieces, presence of core-shape endscrapers, prevalence of short flake endscrapers, composition of backed blades and geometrical microliths. Unfortunately, careful comparisons are not available now seeing multi-levels character of Upper Unite from Siuren I. Meanwhile, the submitted data allow to ascribe prevoiusly the Upper Paleolithic layers of Skalistiy to the Upper Siuren culture association.

As it was presented above, l.III/3-I of Skalistiy rockshelter fall to last spans of Last Glacial (Dryas II-III). This period is connected with two cultural phenomena: the Shankobien and Siuren culture (BIBIKOV*et al.*, 1994; COHEN 1994, 1995). The assemblages from l.III/I-I belong to Shankobien without any doubt. New excavation data allow to investigate the Shankobien in follow frames of references: the radiocarbon estimation of periodisation and the recognition of genetically roots of this culture.

Viewed from a stratigraphical position, the layer III/3 is the most ancient Shankobien assemblage in the Crimea. The typological structure, the diversity of geometrical points and microlithes confirms this idea. Hence, this assemblage registered initial stage of Shankobien development.

As the matter of fact, the origin of Shankobien provides two alternative conceptions: autochtoneous and migratory. Somehow or other, the data analyses doesn't confirmed standpoints about a Caucas (S.N.Bibikov), Near East (D.Ya.Telegin) and Balkan (A.A.Yanevich) origin of Shankobien (COHEN, 1994). Excavations in Skalistiy yielded additional arguments contra migratory determining of this process.

E.A.Vekilova suggested a lack of direct chronological contacts between Siuren I (up.l.) and Shankobien sites, although a genetic link was offered (1971, p.143). More

than probably, those new typological evidences in layer IV of Skalistiy (some crescents and bipoints, growth of blade technique, broadening of blade-blanks spectrum) register typological connections between the Upper Siuren culture and the Shankobien, consequently, the local origin of this last. Moreover, the occurrence of the Shankobien technology is affected by a comparatively long term evolution of the Upper Siuren culture. Nevertheless a simplistic typological succession doesn't reliund complicate process of cultural changes. It may be due to several factors:

1. A relatively long term of chronological hiatus was recorded between layers IV and III/3, which fell to interstadial Bölling. Hence, the l.IV assemblage provides the initial segment of " transitional episode ". The final stages of this even, didn't found for the present.

2. The variety of geometrical and ungeometrical points characterizes exclusively the early Shankobien. This structure includes components of several cultural traditions in taxonomic assumption.

3. Viewed from chronological data, the transitional episode coincides with the cultural transformation of the Mediterranean area: introduction of Final Epigravettian succession, beginning of the sequence with geometrical microliths in Öküzini cave (Turkey), occurrence of Geometrical Kebaran on the Near East (BIETTY, 1991; YALCINKAYA*et al.*., 1995).

4. This question can be discussed on a theoretical plan too.

Any Late Glacial cultures didn't exposed segregate development. Hence, it is quite reasonable to suppose that " blocks of cultures " are involved in the process of cultural changes. It seems that the changes in ethno-cultural map of Europe are affected by the restructuration of social territories, whereby the interaction between external and internal factors must be taken into account. In the spite of majority of new groups have local genetically roots, each of them represents sample of interregional transformation. As is to be expected in the light of discussions (see CONSTANDSE-WESTERMANN, NEWELL, 1990), this process is associated with occurrence of ethno-languiges unites. These last are passive component of the three-levels social structure on the initial stage of development and, subsequently, (the Late Mesolithic-Neolithic) it's became real " spaces of linguistic exchanges " or co-tribes unites. So, origin of the new Late Glacial cultures in Prehistoric Europe assumes interaction in the frames of multi-levels transformation (the various types of contacts with other traditions, the changes in subsistence strategy, borrowings, undirect influences, etc...).

On a clear theoretical plan, " the cultural transformation " subdivides into three types (ARUTYUNOV, 1985): 1) " spontaneous " provides innovation under influences of the internal factors, exclusively 2) " stimulated transformation " is, usually, due to contacts with the more developed societies, 3) " borrowing " like consequent of direct impact.

Accordingly the stereotype embodied in archaeological practice, the environmental fluctuating are universal explanation of any cultural changes including the origin of industries with arched backed points. However, this significant factor could be responsible for the change in dynamics of cultural development, since it usually stressed local resource structure.

Skalistiy data displays the occurrence of arched backed points in environment of cold Dryas I with evolved meadow vegetation and low contamination of Arboreum pollen. The early Shankobien assemblage connects with forest-steppe environment. So, the searching of final conception responsible for Shankobien origin must to estimates sight of social factors in this process.

Follows to tradition, the Shankobien ascribed in the circle of Azil-romanellian sites (BONCH-OSMOLOWSKI, 1934; BIBIKOV*et al.*., 1994).

First approach to the problem of Azil-romanelli defined this tradition as entity, where both, Danubian and Ukrainian, facies were recorded (ESCALON, LUMLEY, 1956). In the present time the industries of Romanelli grotto (l.E-B) defines to the particular group of Finalepigravettian (BIETTI, 1990, p.131). Actually, The Azilian distribution limits of Franco-Cantabrian

region in Western Europe, where several different " realities " must be taken into account (STRAUS, 1985).

In the matter of fact, the distortion in understanding of social aspects are usually issue from formal utilization of the distinct Paleolithic taxons. It does mean, in our case, that the Shankobien attribution in the Azilian affiliation must be rejected.

The usual typological feature of Azilian industry - high quota of backed blades (ROZOY, 1978) doesn't characterized the Shankobien. And from the another side, notable lack of high trapezes and crescents could be registered in the Azilian. Finally, both flat Azilian harpoons and decorated pebbles didn't recognized in the Crimea.

The common features could be defined as follows: the present of various Azilian points and combination of short flake and long blade endscrapers.

The cultural groups with tool kits similar to Shankobien are found outside the Crimea. It could be defined in accordance with the combination of arched backed and double oblique truncated bipoints and big trapezes: Beloles'e in the steppes of Black sea coast (BIBIKOV*et al.*, 1994), Sosruko in the Western Caucas (ZAMIYATNIN, AKRITAS, 1957), sites of Pribalhanskaya culture (?) in Eastern Kaspy coast (KOROBKOVA, 1989).

The assemblages of layers M-3 and M-5 of Sosruco show a high degree of similarities with Shankobien. It entitled to S.K.Kozlowski ascribes Sosruko to area of the Shankobien distribution (1979). Accordingly S.N.Bibikov, Sosruko registers the primary zone of Shankobien origin (1966). Somehow or other cultural groups, characterized above, are more closely linked with Shankobien then Azilian of Western Europe (the typology, territory). Thus, these cultural groups in the basins of Black and Kaspy (?) seas can be previously seen into same technocomplex (Eastern Azilian).

The forth - stages periodisation of Shankobien has had defined in the literature (COHEN, 1994). Last period subdivided into two sub-stages: IV(1) - Shan-Koba l.5, Murzak-Koba l.4 (end of the Dryas III) and IV(2) - Fat'ma-Koba l.5/6, Alimovskiy l.4, 3, Vodopadniy grotto, Siuren II up.l. (first half of Preboreal). Obviously, that upper layer of Skalistiy belongs to sub-stage IV(1).

The Shankobien provides relatively homogenous typological character during three stages of development. Skalistiy data confirm this conclusion. In the beginning of Holocene both, spatial features and settlement pattern of this culture, had changing in the term of resources base reorganization. The typological variety issue from this event, since archaeological data display the several " types of industry " on last stage. The Shankobien communities took part in the origin of MC - Protoneolithic culture in the middle of Preboreal.

IX. SETTLEMENT PATTERN AND SEASONALITY

The hunter-gatherers way of life firmly connected with consumption of seasonal resources. Hence, both, settlement pattern and seasonality, are the principal mechanism of any hunter-gatherer strategy.

IX/1. Microstratigraphy

During excavations we have are disposed to find microstratigraphical evidences of repeated occupation in the frames of different cultural layers.

Both, layer VI and V, provided small hearths, which included the ephemeral lenses and burned underlying balks. These structures gravitated to the bottom of living floors. The depth of the Upper Paleolithic layers fluctuated between 0, 15 to 0, 3 m and findings are recorded, practically, within of each thickness. This may be due to several factors: 1) these layers doesn't enclose structures combined the adaptation to the long term occupation, 2) it's provide the repeated pattern without any rhythms in occupation.

The Shankobien layers supplied another structures. So, level III/3 represents ashy lens with strong concentration of flint and bones remains. The oversurfaces hearths are recorded in the foot of lens. They are recognized accordingly to burned underlying spots seeing the ashy concentration dispersed throughout time. The lens involved oval pit with strong concentration of ash, flint, bones

including one fragment of the human bone. The organic remains from pit represent better preservation comparatively to other findings, since presence of stony ceiling. The data analyses offer preliminary interpretation of this object like the food storage structure.

It is noteworthy, that one sunken hearth recorded directly under level III/3 ashy structure. Follow suit to Shan-Koba l.6 data (see BIBIKOV*et al.*, 1994) it is possible to refers that the initial episode of Shankobien occupation in Skalistiy connected with sunken hearth before the installation of dwelling structure.

The microstratigraphical data provide several burned surfaces in the frames of hearth over the ashy lens accumulation. As a rule, any types of dwellings constructions envisage special hearth location. So, it is not possible to change this location until this structure exists (COHEN, 1992). It is issue that level III/3 provided relatively long term reoccupied structure, which used, probably, accordingly season's fluctuations.

The final span of l.III/3 accumulation coincides with the beginning of rockfall process attached to interstadial Alleröd. Both, destruction of dwelling structure and restriction of living floor area, are affected by rockfall activity. So, probably, the brief chronological break between levels III/3 and III/2 was not due to seasonality.

The level III/2 structure is a same like underlying. The excavations data reveals similar reason of this living floor destruction.

The level III/1 provides hearth with round stony facing, which gravitated to the bedrock. This structure was covered by the upper rockfall horizon too.

The occupation area of layer II contains two hearths without any features of the permanent constructions.

Dwelling structure remains of level III/3 are found, exclusively, on the early Shankobien sites: Shan-Koba l.6, Zamil-Koba I low.l. (BIBIKOV*et al.*, 1994). This fact shows the growth of mobility among Shankobien groups (COHEN - in press). Evidences from Skalistiy confirmed this observations.

IX/2. The structures of lithic industries

The presence of any dwellings structures on the Upper Paleolithic sites is feature of long-term occupation despite of presence/absence numerous flint materials (LEONOVA, 1993, p.75). The available data define growth in the quantity of flint materials in connection with the rise of territoriality first of all (the complex system of flint procurement, utilization of functionally various sites in the frames of the same catchment area).

As a rule, the centers of lithic production and living areas occupy distinct loci on the long-term occupied open air sites. The high quota of debitage products (till 97%) characterizes workshop location, while the living area represents big quantity of tools (LEONOVA, 1993). However, the living area and workshop attached by each other in the small rockshelters conditions. Consequently, the quantitative correlation between debitage products and tools doesn't provide such obviously differences as open air sites.

S.A.Kulakov emphasized six features for the recognition of workshop sites. Mostly significant of them must be pronounced: 1) location of objects beside the outcrop, 2) the predominance of debitage products over tools, 3) the presence of " gaps " in the the chain of knapping technology and 4) the lack of morphologically completed tools among retouched pieces (KULAKOV, 1993, p.7, 8).

The quantity of cores and debitage products altogether extended 95% in assemblages of the Upper Siuren culture of rockshelter Skalistiy. The comparatively not numerous quota completed tools draws the attention to these industries (Tabl. 5). We can't escape the conclusion that the big quota of retouched pieces are performed here and, subsequently, used apart of these sites proper. Both, lack of fauna and structures responsible for long-term occupation, indicate industrial function of Upper Siuren's sites in rockshelter Skalistiy. Probably, these objects employed as the satellite sites in the site catchment area of base camp.

So, several types of the settlement pattern could be emphasized in the Upper Paleolithic of the Crimea including Siuren I data.

The Shankobien layers yielded both, developed group of debitage products and domestic tools. The retouched pieces are produced and utilized in the frames of the site. These evidences allow to ascribe levels III/3, III/2 and II to "the sites - workshops" affiliation. Several approaches to this problem argue the majority of Paleolithic sites are both, workshops and base camps, at the same time (LIOUBIN, 1965, p.55; KULAKOV, 1993, p.7, 8). Hence, concept of " site - workshop ", " base camp " and " long-term occupied site " are different definitions of the same reality.

IX/3. Fauna evidences

All Shankobien sites locate inside External Mountainous belt. For this reason, the theriofauna accumulates forest (red deer, roe deer, wild board, linx), steppe (saiga, horse) and everytherms (bos, bear, fox, lepus). Both, low snow line in the First Mountainous belt and lack of natural shelters in the steppe zone, promoted favorable concentration of recourses inside External belt in the Late Glacial.

The diversity of behavioral structures of this theriocomplex allowed to explore same landscape area in the annual territory (COHEN - in press). The pollens spectrums of Skalistiy display External Mountainous belt ecological development: from the meadow-steppe environment (Dryas I - dumb thickness), the forest-meadow (Prebölling (?) - l.VII, VI), the forest-meadow (Late Dryas I -l.IV) to the forest-steppe (Dryas II - early Alleröd - l.III/3) and forest-meadow (Alleröd, Dryas II - l.III/2, I).

The current available data register the constant presence of ovicaprines in layers contained fauna remains. Ovicaprines didn't recorded neither the ancient Siuren I sequence and the youngest Shankobien, exempt Zamil-Koba I and Alimovskiy rockshelters (VEKILOVA, 1971; COHEN, 1994). Unfortunately, the limited fauna collection from Skalistiy doesn't allows the detail palaeontological explanation.

The comparisons data represents numerous samples of Caprines hunting during Late Glacial of South Europe including the adjacent Mountainous systems (Caucas, Balkans) (BIBIKOV*et al.*, 1994, tabl.24). Several regions supplied obvious and well defined ibex or capra/ibex hunting specialization, for example Cantabrian Spain (STRAUS, 1991) or Turkey (YALCINKAYA*et al.*, 1995, p.570). Thus, viewed from available data, the ovicaprines hunting specialization may be offered relevance subsistence practice of Crimean hunters.

Ovicaprines belong to the settled ungulate with small home range and, hence, can be classified as relatively dense and predictable resources (BAR-YOSEF, BELFER-COHEN, 1989, p.485). Goats and youngest specimens compose small groups (till 20 ind.) (HELMER, 1992, p.48, 51). Caprines prefer rugged terrain and loci beside snow line in the summer. As a rule, the hunting camps orientated to this game located on 500-600 m altitude and more. Within Crimean landscape structure this location connected with Internal Mountainous belt (till 740 m), where both, the natural shelters and Paleolithic sites, are almost missing.

G.Bailey suggested, that caprines home ranges and the human exploration territories intersected in the Late Glacial in term of lower snow line (1983, p.157-159). The Bodrak valley depicts numerous natural shelters, which, hypothetically, could be connected with the caprines home ranges. Probably, site catchment area of Skalistiy is coincided with caprines home ranges and the hunting activity fell to the cold period of year.

The cold season of hunting can be defined viewed from the presence of saiga remains too. The multi-approach shows, that saiga herbs spread in Crimea during the winter period in the search of favorable condition for reproductive season (RAKOV, 1963; BARYCHNIKOV*et al.*, 1994). Mostly available adult males become objects of the hunting prey. Exclusively adult specimens were registered amongst saiga remains in the level III/2 of Skalistiy.

The Late Glacial hunting has obvious features of specialization (BARKER, 1981). Even few samples can confirmed this conclusion: Gazell on the Near East, Reindeer on the North Europe, Red deer and Ibex in the Cantabrian Spain, Bos - South France, Bison - steppes of Black sea coast, mammoth - the Central Russian Plain, etc... Viewed from common assessing the Upper Paleolithic of the Crimea provided saiga hunting

specialization (BIBIKOVA, BELAN, 1979; BARISHNIKOV *et al.*, 1994). This conclusion issue from Siuren I fauna estimation. In accordance with new data, this strategy must be reestimated in the chronological notion. So, we can suggest, that the ovicaprines hunting specialization replaced this strategy in the beginning of Late Glacial.

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The introductory subsistence data analyses may be summarized as follows. All assemblages all rockshelter Skalistiy, exempt layer III/I, belong to the reoccupied objects. Sites of the Upper Siuren culture were workshops, although we can't to define it's industrial specialization yet. The Shankobien levels (III/3, III/2, II) provide remains of the base camps, probably, connected with cold period.

The Skalistiy data confirmed thesis about growth of mobility among Shankobien communities. Microstratigraphy of Shan-Koba and Skalistiy registered shift of the home base along annual territory during periods of " the stratigraphical discontinuity ". The lithic assemblages display occurrence of cultural innovations after these breaks and the transition from one stage to other attached to mobility growth.

Submitted analyses on chronostratigraphy of rockshelter Skalistiy is the first approach to these data. Precise estimation would be done in the resulting of new testes and new approaches.

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Figure 1 : Rockshelter Skalistiy. General view.

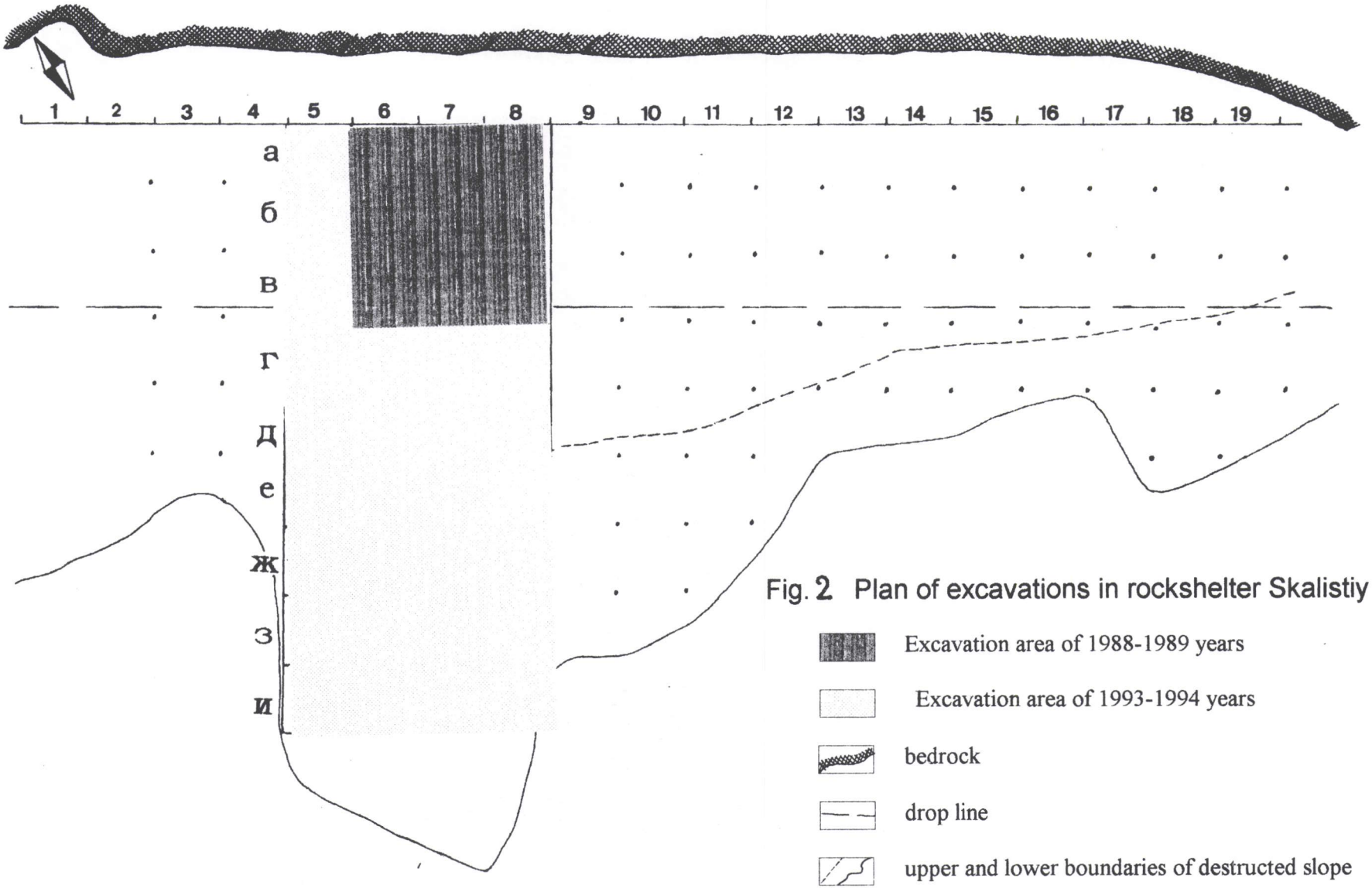

Fig. 2 Plan of excavations in rockshelter Skalistiy

Excavation area of 1988-1989 years

Excavation area of 1993-1994 years

bedrock

drop line

upper and lower boundaries of destructed slope

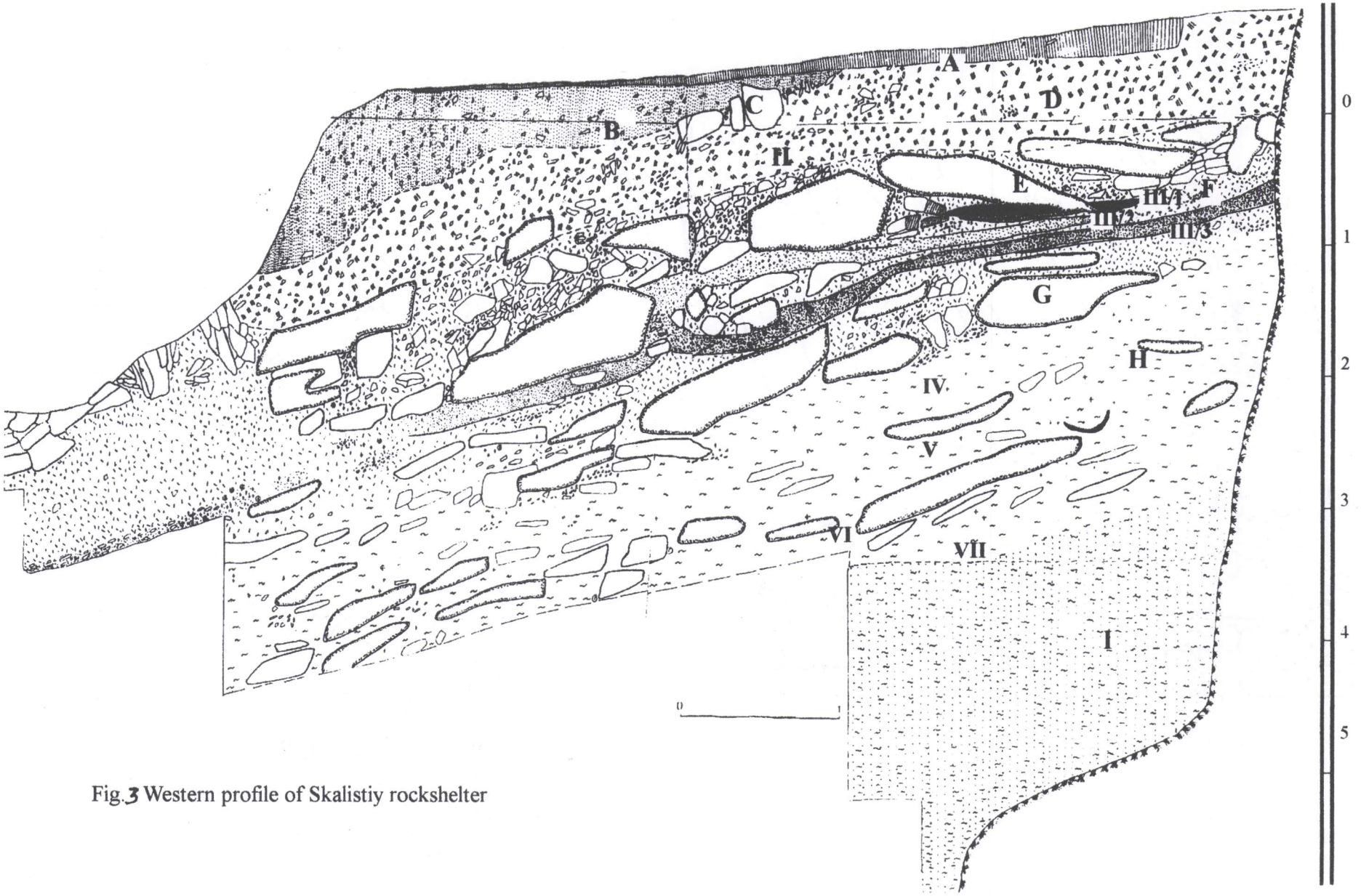

Fig.3 Western profile of Skalistiy rockshelter

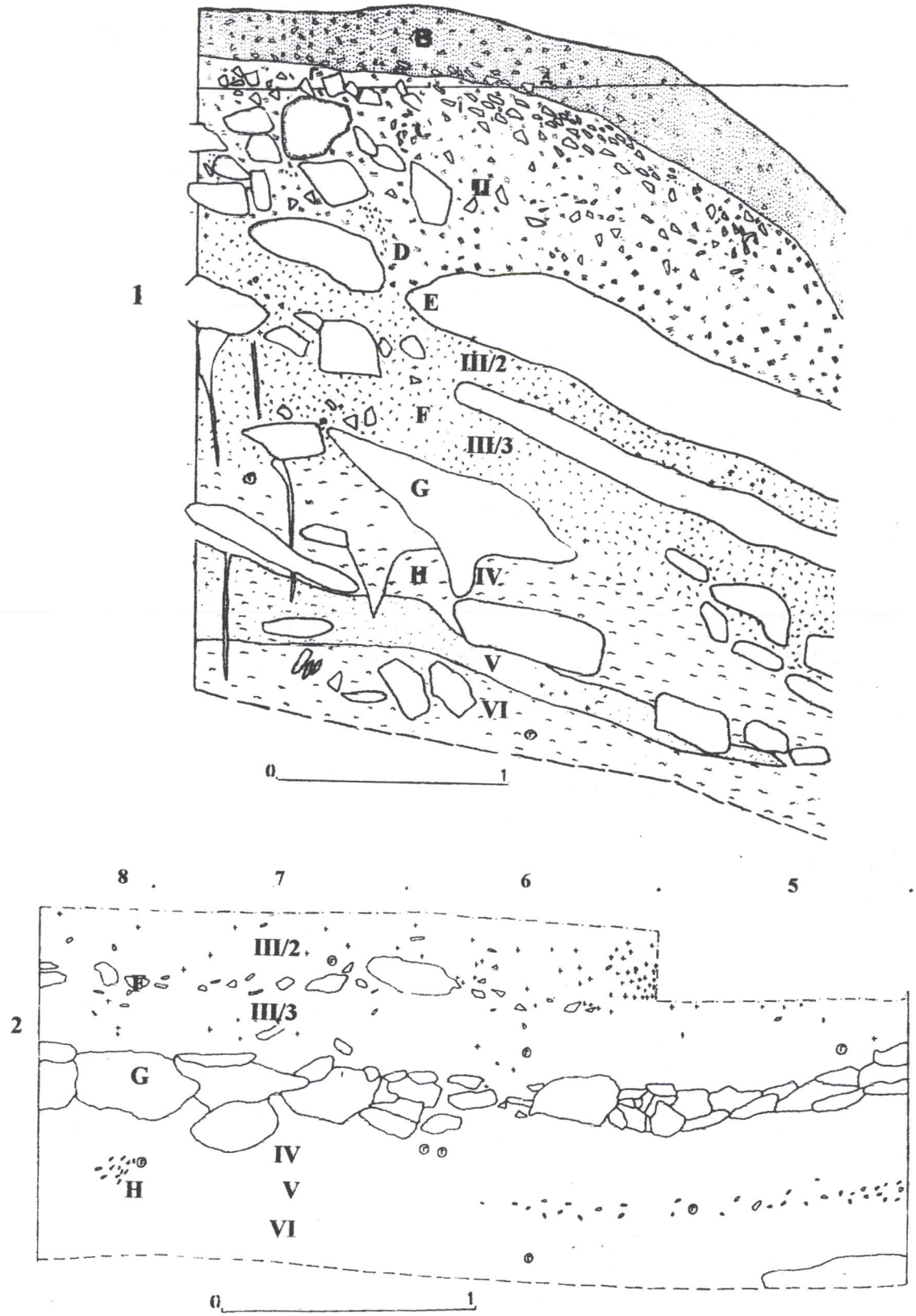

Fig. 4 Rockshelter Skalistiy: 1. Eastern profile; 2. Southern profile

Figure 5 : Rockshelter Skalistiy : Strong hummers.

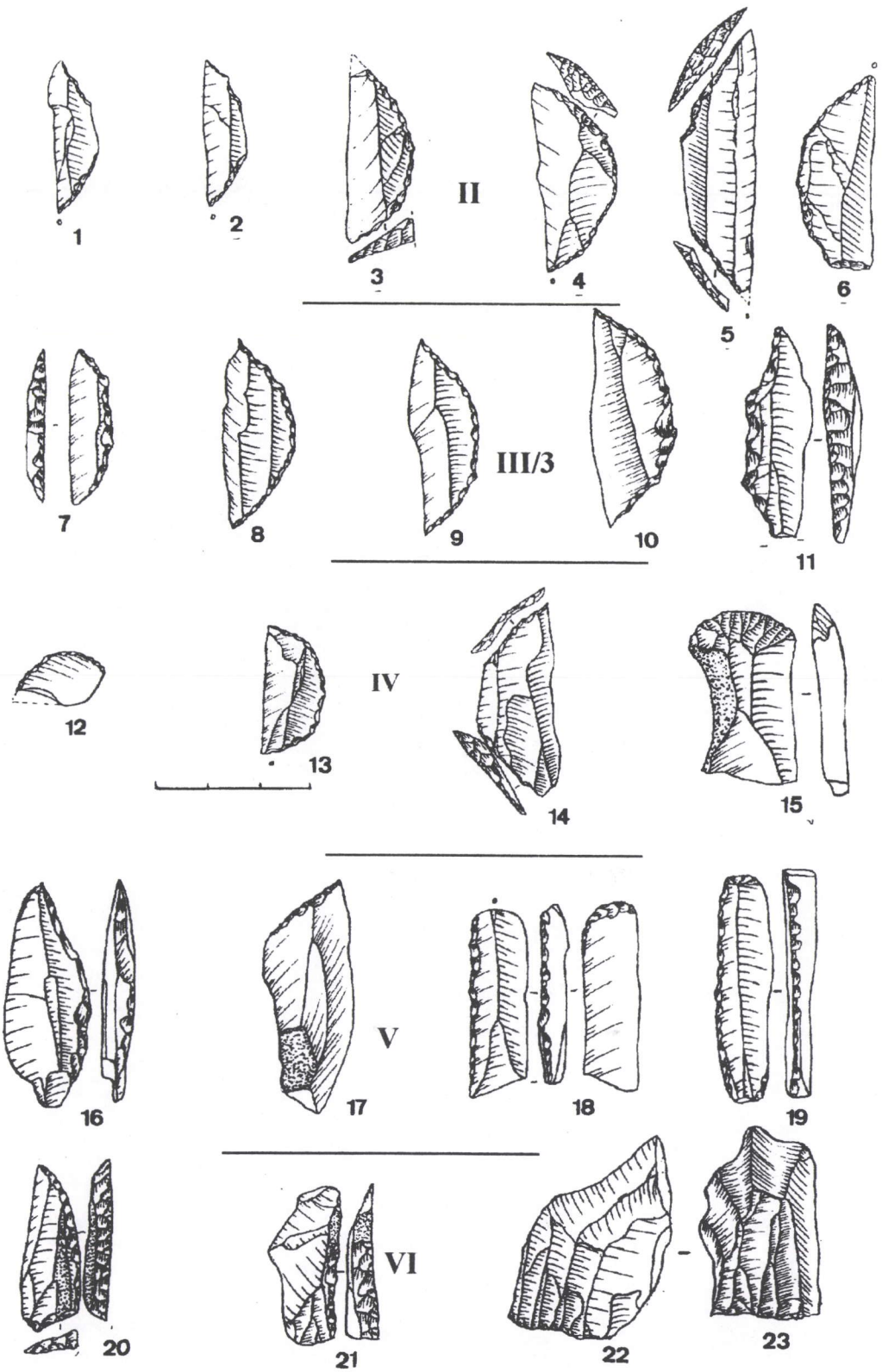

Fig. 6 Rockshelter Skalistiy (selected tools): 1-6 - l.II; 7-11 -l.III/3; 12-15 - l.IV; 16-19 - l.V; 20-23 - l.VI.

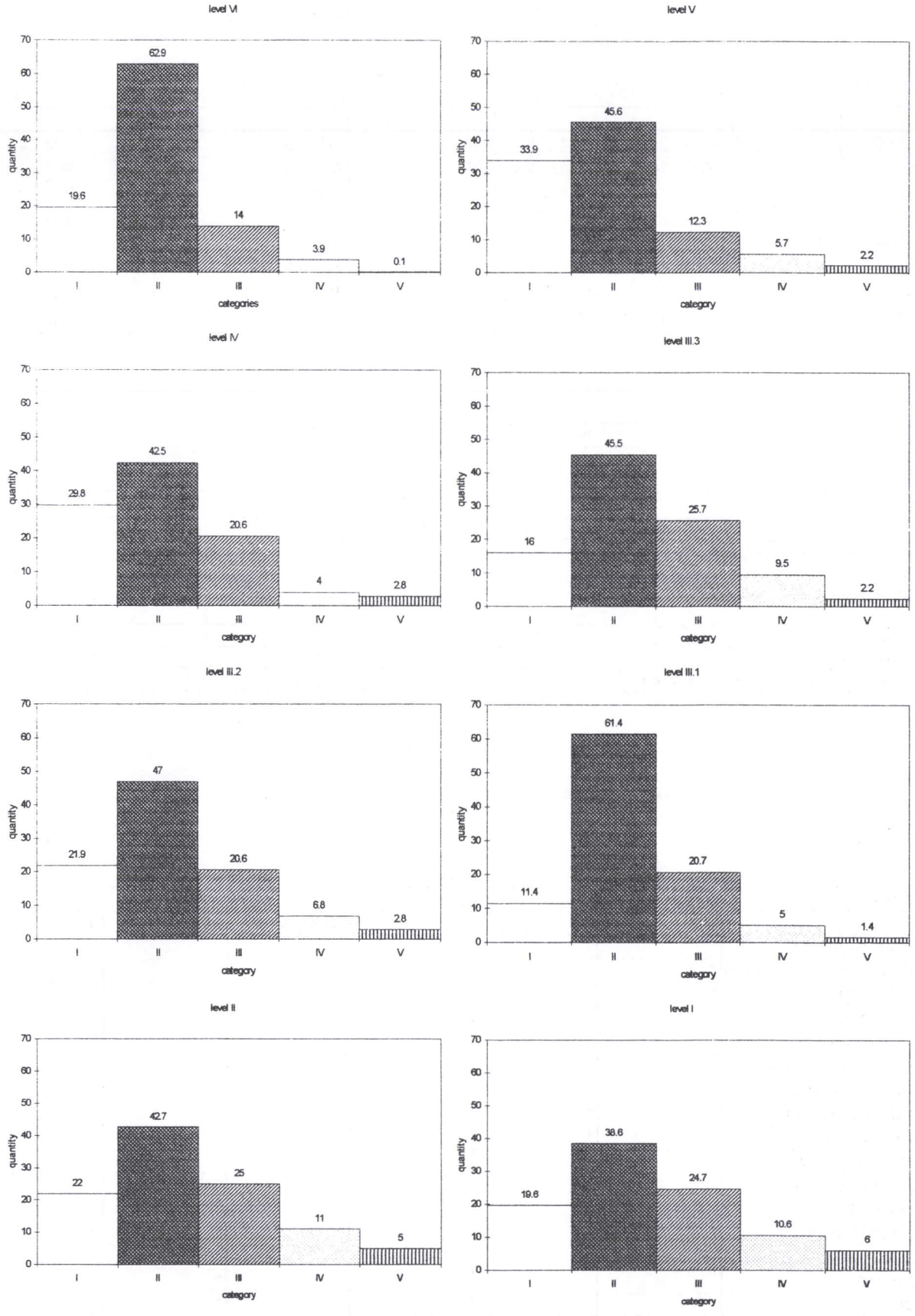

Fig.7_ Blades distribution according to larger. Categories: I < 0.9 cm; **II** < 1.5 cm; **III** < 2 cm; **IV** < 2.5 cm and **V** > 2.5 cm.

Table 1 : Radiocarbon data from Skalistiy sequency

Lab. number	Method	Age-unc. BP	Age-cal. BC	Level/Horizon	Area sample taken	Year taken	Material
OxA 4889	^{13}C	18.300+/-220	20000-19650	VII (?)	A-V - 5	1993	bone
OxA 5161	^{13}C	14.880+/-180	16025-15625	VII	A-V - 5	1994	charcoal
OxA 5167	^{13}C	15.020+/-150	16150-15825	VI	A-V - 5	1994	charcoal
Lv 2133	^{13}C	15.510+/-310	16775-16150	V	A-V - 5	1994	charcoal
OxA 5166	^{14}C	14.570+/-140	15.650-15.325	IV	E-7	1994	charcoal
OxA 4888	^{13}C	12.820+/-170	13475-12925	III/3	A-V - 5	1993	bone
OxA 5165	^{13}C	11.750+/-120	11900-11600	III/3	A-V - 5	1994	charcoal
OxA 5164	^{13}C	11.620+/-110	11725-11475	III/2	A-G - 5	1994	charcoal

Table 2 : Theriofauna from Skalistiy

SPECIES			LEVELS			
	VI	III/3	III/3-pit	III/2	III/1	II
Ovis-capra (sheep-goat)	*	*	*	*	*	*
Bos sp.		*	*			
Cervus elaphus (red deer)		*				*
Saiga tatarica				*		
Predators	*					
Avis (Birds)	*		*	*		
Quantity o estim./unest. bones	4/0	26/960	15/133	41/283	27/385	9/143

Table 3 : Microfauna from Skalistiy rockshelter

Species			Levels			
	VII	VI	V	IV	III/3	III/2
Citellus suslicus	*		*			
Clethrionomys glareolu	*		*			
Ellobius sp.	*					
Arvicolidae	*	*	*	*	*	*
Rodentia sp.	*	*	*		*	*
Aves (passeriformes)	*		*			
Ellobius talpinus		*		*		*
Cricetus cricetus		*	*	*	*	
Erinaceus sp.		*				
Scirtopoda telum		*	*	*	*	
Microtus arvalis			*	*		
Cricetulus sp.			*			
Sorex minutus				*		
Apodemius flavicollis				*		
Lepus sp.					*	
Pisces					*	
Total	36	57	59	23	39	26

Names/ 1-quantity, 2-%	Cultural levels																					
	VII		VI		V		IV		III/3		III - 1988-89		III - pit		III/2		III/1		II		I	
	1	2	1	2.00	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
cores	2	1.4	21	0,4	29	0,6	9	0,6	135	0,7	33	0,2			41	0,9	9	1,2	43	0,6	13	0,3
I. with one striking platform			6		9		6		74		22				23		4		22		6	
I.1 unvolumétric			4		4		4		30		14				8				14		5	
I.2 semivolumetric			1				1		26		5				4		3		5		1	
I.3 volumetric									4		1				4				1			
I.4 with narrow flake surface			1		2				12		2				7		1		2			
I.5 low angle cores			4		3		1		2													
II. with two striking platforms	1		2		2				18		4				6		1		3		6	
II.1 bipolars	1		1		1				8		2				3		1		2		3	
II.2 subcrosses									1													
II.3 orthogonal-adjacents					1				6												2	
II.4 bipolar-ajacent									2		1								1			
II.5 orthogonal-alternatives			1						1		1				1						1	
II.6 bipilar-alternatives											1				1							
III. with three striking platforms									1		3								1			
IV. discoid cores									6										1		1	
V. preformes	1		9		12		3		26		4				12		4		16			
Vi. unestimated fragments					6				10													
flakes	61	43,2	1310	40,2	1562	36,4	450	33,7	7498	39,5	5376	47,3	281	51,3	1632	36,1	334	45	3691	60	2716	64,8
cortical flakes	11	7,8	345	10,5	315	7,3	106	7,9	1393	7,3			38	6,9	292	6,4	54	7,2				
debris (as well cores like)	24	17	365	11,2	676	15,7	232	17,4	2306	12,1	722	6,3	34	6,2	540	11,9	81	10,9	317	5,1	154	3,6
burin spalls			5	0,1	39	0,9	7		57		10				21				17		7	
chips	18	12,7	505	15,5	836	19,4	226	16,9	2588	13,6	1977	17,4	29	5,3	812	17,9	51	6,8	442	7,1	481	11,4
nodules			26	0,7	39	0,9	19	1,4	49	0,2					23		4		43	0,6	7	
blades	21	17,8	509	15,6	486	11,3	174	13	3414	17,9	2582	22,7	127	23,2	741	16,3	140	18,8	1240	20,1	650	15,5
cross-sections	1		20	0,6	25	0,5	10	0,7	448	2,3	65	0,5	6	1	73	1,6	16	2,1	48	0,7	1	00,2
reshaping remouvals			32	0,9	25	0,5	6	0,4	65	0,3	11	0,09	2	0,3	29	0,6	7	0,9	34	0,5	5	0,1
crested blades	2	1,4	38	1,1	58	1,3	4	0,3	152	0,8	47	0,4			51	1,1	12	1,6	39	0,6	15	0,3
hammers-anvils (as well debris)			339		482		559		839				41		125		45		34			
cores & debitage products (total)	140	99,9	3171	97.00	4090	95	1243	93	18108	95	10823	95	517		4255	94	708	95	5914	96	4049	96
lithic speciments (total)	141	100	3256	100.00	4291	100	1333	100	18974	100	11355	100	547	100	4519	100	741	100	6155	100	4189	100
artifacts (total)	141		3595		4773		1892		19813		11355		588		4644		786		6185		4189	

Table 4 : Skalistiy rockshelter. Primary retouching

Names/	Cultural levels																							
1-Quantity, 2- %	VII		VI		V		IV		III/3		III-1988-89		III/3-pit			III/2	III/1		II		I			
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2		
I.ret. blades & cross-sections			6	7	38	19	24	26	193	22	160	30	9	30	66	25	12	36	47	19,8	42	30		
II. blades with flat inverce ret.									1						6				1					
III. truncated blades			9	11	20	10	6	7	32	3,6	13	2,4	2	6,6	12	4,5			8	3,3	8	5,7		
IV. bl. with notched retouch			6	7	8	3,9			42	4,8	19	3,5	2	6,6	18	6,8	9	27,2	16	6,7	2	1,4		
V.retouched flakes			18	21	66	32,8	24	26	184	21,2	120	22,5	8	26,6	54	20	3	9	54	22,7	56	40		
VI.endscrapers	1		8	9	10	5	10	11	116	13,3	54	10	3	3	39	15	6	18	30	12,6	8	5,7		
blade endscrapers			2		2		5		51		25	4,6			12	4,5	1		14	5,5	3	2,1		
flake endscrapers			4		6		3		62		25	4,6	3		26	9,8	5		16	6,7	4	2,8		
core-shaped scrapers	*1*		2	2,3	1		2	2,2	3	0,3	4	0,7			1	0,3					1	0,7		
VII. burins			9	11	7	3,4	8	9	48	5,5	15	2,8	2	6,6	17	6,4	1	3	13	5,4	4	2,8		
blade burins			5		1		4		44		15		2		12		1		13		4			
blanks									2						1									
VII. burins by Krukowski										3						1								
IX. backed blades			4	5	8	3,9			2	0,2														
X. points			7	8	16	8	9	10	139	16	130	24,4	1	3,3	19	7,1	1	3	43	18,1	11	7,8		
geometrical points			1	1	1		2	2,2	83	9,5	70	13	1	3,3	14	5,3			22	9,2				
ungeometrical points			6	7	15	7,4	7	7,7	44	5	57	10,7			2	0,7	1	3	21	8,8	11	7,8		
blanks										6						2								
micropoints									6	0,6	3	0,5			1	0,3								
XI. geometrical microlits					1	0,4	3	3	66	7,6	20	3,7	2	6,6	18	6,8			15	6,3	5	3,5		
crescents							3	3	21	2,4	11	2			5	1,8			11	4,6	4	2,8		
trapezes									18	2	5	0,9			6	2,2			3	1,2				
triangles					1				4	0,4	4	0,7			1	0,3			1	0,4	1	0,7		
debris of g.m.									23	2,6			2	6,6	6									
Diverce			16	19	26	13	6	6,6	40	4,6	1	0,1	1	3,3	14	5,3	1	3	10	4,2	12	8,5		
unestimated fragments	5		2	9																				
Tools (total)	**1**	**100**	**85- 2,6%**	**100**	**201--4,6%**	**100**	**90-6,7**	**100**	**866-4,6%**	**100**	**632-4,6%**	**100**	**30-5,4%**	**100**	**264-6,8%**	**100**	**33-4,4%**	**100**	**237-3,8%**	**100**	**140-3,3%**	**100**		
Lithic (total)	**141**		**3256**		**4291**		**1333**		**18974**		**11365**		**547**		**4519**		**741**		**6161**		**4189**			
Artifacts (total)	**141**		**3595**		**4773**		**1892**		**19813**		**11365**		**588**		**4644**		**786**		**6185**		**4189**			

Table 5 : Skalistiy rockshelter. Secondary retouching