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7 - SNAIL FAUNA DATA FROM SIUREN I

Constantine MIKHAILESKU

Introduction

Traditional methods of snail sample selection were used on sediments from the archaeological levels at Siuren I. Sample selection began with preliminary screening of nearly all sediments through 5 mm sieves. The selected fraction was then screened through 1.5 mm sieves; and the resulting fraction (between 1.5 and 5 mm in size) was washed using the same sieves of 1.5 mm. Occasionally, if shells smaller than 1.5 mm were found, a 1 mm screen was also used. This occurred in certain levels at Siuren I containing very small shells of *Caecilioides acicula*, *Caecilioides raddei* and *Columella edentula*. After the resulting sediments were washed and dried, the snail remnants were selected. Because the snail shells are very fragile, most of them were selected directly from the sieve during dry or wet screening. A smaller portion of cockleshells and fragments was later selected from the washed and dried residue.

The archaeologists studying the site (Dr. Victor P. Chabai, Dr. Alexander I. Yevtushenko, Dr. Yuri E. Demidenko and Sergei V. Tatartsev) collected a significant portion of the malacological assemblages at Siuren I. During the 1995-1996 fieldwork at Siuren I, the author was greatly aided by an assistant, post-graduate Vladimir Telinov (Institute of Geography, Moldavian Academy of Sciences) and also by the Crimean archaeologists, to whom I express my sincere appreciation for the very difficult and accurate work in sample collecting.

Details of the sampling methods and the principal ecological groups of Western Crimean snails, as well as the environmental and morphometric parameters of the identified species, have been previously published by the present author (Mikhailesku 1999).

Siuren I snail fauna data

Thirteen samples were selected from the site, including four samples during the excavations in 1995 and nine samples in 1996. As seen in table 1, the snail fauna at Siuren I are not very dense, but are still fairly diverse. They include 337 shells of 31 specimens belonging to 8 ecological groups (fig. 1).

For Siuren I, the specific presence of four species of freshwater and three species of marine mollusks is of importance. While the presence of the first group may be partially explained by the proximity of the site to Belbek River, Paleolithic humans evidently introduced the shells of the second group to the site. 32 shells have clear perforations in them and evidently served as decorative objects, amulets or necklaces. In general, the preservation of all fossil shells is very good and enables identification without difficulty. Despite the fact that the most samples are not very large, the range of ecological groups is represented, so environmental diagrams were created for each level studied (fig. 1). These diagrams are used to demonstrate the main changes in ecological composition of the assemblages at ecological groups (habitats) and specimen levels. This allows elucidation of the main environmental changes caused preponderantly by climatic fluctuations.

Some species of mollusks are ecologically very specialized and occur only in certain habitats. This species group includes mostly freshwater mollusks and hydrophilic species of snails, as well as some rocky and soil species. Being dependent mostly on presence of a water source, they usually have an intrazonal distribution.

From archaeological Unit H one sample was collected consisting of only two shells of *Helix lucorum taurica*. This species typically occupies relatively warm ecosystems of mesophile or meadow steppes, and also prefer floodplains and open landscapes with bushes, shrubs and small trees.

From archaeological Unit G six samples were collected, corresponding to levels Gd, Gc1-Gc2, Gb1-Gb2 and Ga.

In level Gd, *Helix vulgaris* (1) and *Chondrus bidens natio pygmea* (1) were found in addition to *Helix lucorum taurica*. All of these species indicate that the same type of meadow steppe landscapes with bushes and shrubs continue to predominate during the deposition of level Gd. At the same time, the appearance of *Chondrus bidens natio pygmea*, a typical inhabitant of xerophile steppes and semideserts, indicates that the climate became slightly drier, compared to the deposition phase for Unit H.

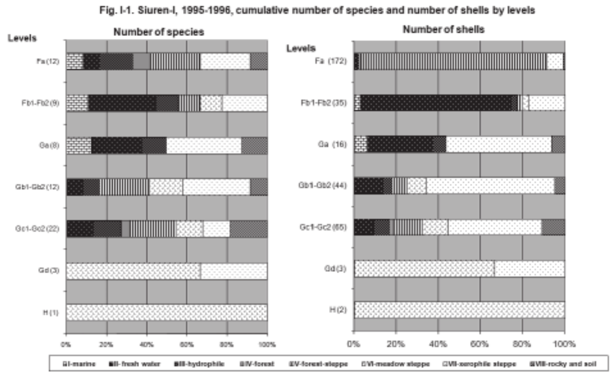

Figure 1 - Siuren-I, 1995-1996, cumulative number of species and number of shells by levels

The presence of two species of *Helix* (*H. lucorum taurica* and *H. vulgaris*) serves as a good indication of the interstadial nature of this assemblage. For the Crimean snail assemblages, both species are considered to be warm and relatively humid elements and are specific only to the warm interglacials and interstadials of Upper Pleistocene, being absent in the faunas coming from stadials.

From level Gc1-Gc2, two samples were collected, one from each sub-level (Gc1 and Gc2). From sub-level Gc2, 10 fossil shells were collected. Four of them appertain to the freshwater forms *Theodoxus fluviatilis* (3) and *Th. transversalis* (1), another four - to xerophiles *Helicella dejecta* (3) and *H. krynickii* (1), one more - to mesophile *Helix vulgaris* and the last one - to *Oxychilus diaphanellus*, which is a forest-steppe habitant. This sample is

SITE	Ecological Group	SIUREN I													
YEARS		1995				1996									Total
Name of species / Samples		Fa1	Fa2	Fb1	Fb2	Fb1	Fb2	Ga	Gb1	Gb2	Gc1	Gc2	Gd	H	
Helicella (*Helicopsis*) *dejecta* Cr. et J.	Xerophile steppe	2	3					2	4	1	3	3			18
H. (*H.*) *striata* (Mull.)	Xerophile steppe							1	2						3
H. (*H.*) *retowski* Clessin.	Xerophile steppe								1		3				4
H. (*Xeropicta*) *Krynickii* (Kryn.)	Xerophile steppe	4	2		2	3		5	12	7	19	1			55
Chondrus (*Buliminus*) *bidens* (Kryn.)	Xerophile steppe	1	1			1									3
Ch. (*B.*) *bidens natio pygmaea* (Kryn.)	Xerophile steppe												1		1
Helix (*Helicogena*) *lucorum taurica* (Kryn.)	Meadow steppe								1	1	2		1	2	7
H. (*H.*) *vulgaris* Rossm.	Meadow steppe								1	1	2	1	1		6
Chondrula tridens Mull.	Meadow steppe				1						3				4
Oxychilus diaphanellus (Kryn.)	Forest-steppe									1	2	1			4
Vitrea pygmaea Bttg.	Forest-steppe										1				1
V. diaphana (Stud.)	Forest-steppe								1		1				2
Clausilia (*Mentissa*) *gracilicosta* (Rssm.)	Forest-steppe		116			1			1		2				120
Cl. (*M.*) *canalifera* (Rssm.)	Forest-steppe		18								2				20
Clausilia (*M.*) sp.	Forest-steppe	3	16												19
Euconulus fulvus Mull.	Forest areas	1									1				2
Pyramidula rupestris (Drap.)	Rocky and soil										3				3
Pupilla muscorum L.	Rocky and soil										1				1
P. triplicata (Stud.)	Rocky and soil								2		1				3
Caecilioides raddei (Bttg.)	Rocky and soil	1													1
C. acicula Mull.	Rocky and soil							1			2				3
Columella edentula (Drap.)	Hydrophile										1				1
Vallonia costata Mull.	Hydrophile								2		2				4
Succinea oblonga Drap.	Hydrophile	1		1				1			2				5
Lithoglyphus naticoides C. Pff.	Fresh water				3	3					1				7
Theodoxus transversalis (L.)	Fresh water				4	2		2				1			9
Theodoxus fluviatilis (L.)	Fresh water		1	2	8	3		3	2	4	1	3			27
Valvata piscinalis Mull.	Fresh water	1													1
Cerastoderma glaucum Reeve*	Marine						1								1
Apporhais pespelicani L.	Marine							1							1
Gibbula maga albida (Gm.).	Marine		1												1
Total number of shells		14	158	3	18	13	1	16	29	15	55	10	3	2	337

Table 1 - Siuren I Fossil Snails

not representative but, as well as the previous sample, it also appears to be an interstadial type of assemblage. Although it does not contain very many warm elements (*Helix lucorum taurica* is absent), this sample may correspond to the same interstadial, when the climate was relatively humid but probably not as warm as during earlier stages.

Much richer and diverse is the sample from level Gc1 with 55 shells of 21 species, representing seven ecological groups of mollusks. The most common are steppic xerophiles (25 shells), followed by forest-steppe (8), rocky and soil fauna (7), meadow steppes (7), hydrophiles (5) and forest areas (1). Two shells of freshwater *Lithoglyphus naticoides* (1) and *Theodoxus fluviatilis* (1) with human-made perforations in them were also found. This is clearly an interstadial type of mollusk assemblage, which suggests that floodplain meadow steppe and forest-steppe landscapes predominated around the site and the small river was still active.

The diagrams indicate that forest and forest-steppe landscapes predominated around the site during the depositional phase of level Gc1-Gc2 and that the climate was slightly colder, but relatively more humid than today. The presence of one shell of cold-loving *Columella edentula* in sub-level Gc1 and a sufficiently high number of hydrophiles and rocky and soil elements confirm this hypothesis.

From level Gb1-Gb2, two samples were collected, one from each sub-level. The sample from sub-level Gb2 includes 15 shells. In this assemblage the inhabitants of xerophile steppes predominate: *Helicella krynickii* and *H. dejecta* (8), as well as the freshwater *Theodoxus fluviatilis* (4). In the minority, forest-steppe (*Oxycillus deilus* -1) and meadow steppe species (*Helix lucorum taurica* - 1 and *H. vulgaris* -1) are also present.

The sample from sub-level Gb1 is much more numerous, including 29 shells from six ecological groups. This appears to be an interstadial assemblage, given its diversity and the presence of some hydrophiles and sufficient warm rocky and soil elements. The inhabitants of xerophile steppes and semi-deserts (19) predominate, constituting about 70% of the total sample. Compared with the previous samples, the hydrophile *Vallonia costata* (2) and the rocky and soil form *Pupilla triplicata* (2) appear in this sub-level for the first time. Both of these species prefer humid zones near water basins. The number of freshwater forms (*Theodoxus fluviatilis* - 2) decreases, but forest-steppe forms (2) increase slightly. The presence of *Clausilia gracilicosta*, which prefers to live on small *Juniperus* trees, should be mentioned.

As seen in the diagrams (fig. 1), compared with the previous sample, the open areas of meadow and xerophile steppes slightly increase, but the hydrophiles, forest-steppe and rocky and soil elements remain high, constituting about 30% of the total number of shells. In its composition, this assemblage is very similar to the previous one from level Gc1-Gc2) and both of them may correspond to different stages of a single interstadial.

From level Ga, one sample was collected, including 16 shells of eight species. 50% of cockleshells appertain to *Helicidae*, the typical inhabitants of xerophile steppes and semi-deserts. The hydrophile *Succinea oblonga* (1), the rocky and soil inhabitant *Caecilioides acicula* (1), the freshwater *Theodoxus fluviatilis* (3), *Th. transversalis* (2) and the marine mollusk *Apporhais pes pelicani* (1) are also present. Such a range indicates that open landscapes predominated and a small river flowed near the site. The presence of *Caecilioides acicula* suggests that the underground water level was very close to the surface. All shells of the freshwater and marine mollusks have human-made perforations in them, used as necklaces. The shell of *Apporhais pes pelicani* is very important, which was introduced to the site by Paleolithic humans from the Black Sea side where the shells are preserved in older sediments. This is a very warm and stenogaline form, preferring basins with salinity of more than 30 promilles. *Apporhais* is more specific to the Mediterranean Sea than to the Black Sea. Because of the very low salinity of the Black Sea, during the Quaternary this form only once penetrated into the Black Sea basin, during the Last Interglacial, when the Karangatian transgression of the Black Sea had its maximal high level. The stratigraphic and paleontological records from the Black Sea shelf and Upper Pleistocene terraces and shorelines indicate that the Bosphorus channel was opened that time and the basin's level reached about +8 meters (Mikhailesku 1990). During this transgression, the salinity of the Black Sea highly increased and *Apporhais* was able to survive not only in the southern part of the basin, but also along the northern coast of the Black Sea. As a confirmation of this hypothesis, similar shells of *Apporhais pes pelicani* the author found in the sediments of the key outcrops of Carangatian terrace: Kape Karangat, Kape Tschauda, Elitigen, Lake Uzunlar and Sudak. With the exception of the last outcrop (Sudak), all other sites are located in Eastern Crimea, fairly far from the area investigated. It should be also mentioned that some shells of *Apporhais pes pelicani* were found at Siuren I during the 1920s excavations (see Bonch-Osmolowski 1934; Vekilova 1957).

According to the diagrams (fig. 1), during the deposition of level Ga, the proportion of xerophile elements decreased and hydrophiles, rocky and soil and freshwater mollusks increased. But such changes may be considered only as an indication since the sample is very small.

Summarizing the malacofauna data from the site's lower cultural bearing deposits (archaeological Units H-G), it should be mentioned that two kinds of snail assemblages are represented. The first one is typical of open landscapes, preponderantly meadow steppe. This is represented by the very small assemblages from Unit H and level Gd of Unit G. The assemblage from level Gd that is the oldest sample for Unit G, is very interesting and appears to be more comparable to the malacofauna from Unit H than to the other levels of Unit G. The sample diagram indicates a slightly drier climate compared with the conditions for Unit H. But again, it should be remembered that such climate reconstructions are only indicative, as both samples (Unit H and level Gd) are very small and not representative enough.

The specimens and ecological group compositions for the other three assemblages of Unit G are fairly similar. Such similarity allowed us to suggest that most of Unit G involves a short time frame and less significant climate fluctuations may be observed here. High proportions of warm and humid elements suggest that all three assemblages represent an interstadial type of fauna and may represent different stages of snail evolution within a single interstadial. All of these assemblages (from levels Gc1-Gc2, Gb1-Gb2 and Ga) are characterized by a large range of mollusk ecological groups. As seen in the diagrams (fig. 1), the assemblages from these levels indicate the existence of very diverse ecological niches around the site, such as those preferred by hydrophiles, rocky and soil, forest and forest-steppe associations. Compared with the previous samples from Unit H and level Gd, areas of steppe landscapes evidently decrease and those of forest, forest-steppe and floodplains increase. The increasing number of hydrophiles and rocky and soil humid elements are also in good agreement with the larger proportion of freshwater mollusks.

The malacofauna data for archaeological Unit F, or the site's middle cultural bearing deposits, come from the following levels (from bottom to top): level Fb1-Fb2 with two sub-levels (Fb1 and Fb2) and level Fa1-Fa2 with two sub-levels (Fa1 and Fa2). However, two other levels of Unit F (Fc and Fa3) did not have any snail shells.

From level Fb1-Fb2, four samples were collected. Since Unit F was excavated during 1995 and 1996, two separate samples from each sub-level were collected (tabl. 1). In sub-level Fb2, 19 shells of six species of four ecological groups were found. Freshwater forms predominate, represented by *Theodoxus fluviatilis* (8), *Th. transversalis* (4) and *Lithoglyphus naticoides* (3). Most of these shells have human-made perforations. Snails are represented only by xerophile steppe inhabitants *Helicella krynickii* (2) and *Chondrula tridens* (1). One shell of marine mollusk *Cerastoderma glaucum* was also collected from this sub-level. This shell is not perforated and we consider that humans introduced it to the site from the Black Sea side. This form is much more common than *Apporhais*. It penetrated repeatedly (at least 3-4 times, during the highest Quaternary transgressions) into the Black Sea from the Mediterranean. The first penetration of *Cerastoderma glaucum* in the Black Sea basin occurred by the end of Early Pleistocene and later became a major component of the marine faunas, specific for all Black Sea transgressions during the Middle - Late Pleistocene and also in the Holocene (Nevesskaya 1965). It is necessary to mention some interesting facts that refer not only to the evolution of this specimen in the region, but also to the level and salinity evolution of the Black Sea basin during the Quaternary. It has been clearly established that from the Early Pleistocene till the Holocene *Ceroastoderma glaucum* was not a permanent inhabitant of the Black Sea (Mikhailesku, 1990). The salinity parameters of this specimen are from 10-12 parts per thousand to 30-35 parts per thousand, such that during the deepest regressions of the Black Sea, when the sea level decreases below the level of the Bosphorus (-36 meters), water salinity also significantly decreases, (sometimes lower than 5-7 parts per thousand) and all marine mollusks disappeared, including *Cerastoderma glaucum*. For example, the last such very deep regression took place during the New-Euxinian stage of the Black Sea basin evolution. According to numerous records of absolute dating, the deepest level of this regression (about -90-100 meters lower than the actual level of the Black Sea) was reached about 20-18,000 years ago. The water salinity during the New-Euxinian stage of the Black Sea evolution decreases below 5 parts per thousand, which is why *Cerastoderma glaucum* as well as other marine mollusks disappeared at this time. This specimen again appeared in the Black Sea basin about 7,000 years ago, when the increasing level of the Mediterranean Sea rose higher than the Bosphorus level and the marine fauna penetrated the Black Sea.

The assemblage from sub-level Fb1 includes 16 shells of seven species of four ecological groups. The same species of freshwater mollusks predominate (10). In the minority are xerophile (4), forest-steppe (1) and hydrophile (1) inhabitants.

The richest sample for the entire site is from sub-level Fa2 with 158 shells of eight species of four ecological groups. From its composition, it is clearly an interstadial type of snail assemblage indicating warm and relatively humid climatic conditions. Specific for this sample is the absolute predominance of forest-steppe species of *Clausiliidae* (150), followed by inhabitants of xerophile steppes and semi-deserts (6) and only two shells appertain to the water forms. Between the latter *Gibbulla maga albida* should be mentioned, which, like *Apporhais pes pelicani*, is a worm marine stenogaline. In the Black Sea region, both species are specific only for sediments of the Karangatian basin. Their shells have also been found in many boreholes on the shelf, including the northwestern part of the Black Sea, and in sediments of the Last Interglacial terrace on the Crimean and Caucasian sides (Mikhailesku 1990).

The sample from sub-level Fa1 includes 14 shells of eight species of seven ecological groups. In this assemblage, xerophiles (50% of the sample) predominate. The proportion of forest and forest-steppe forms is relatively high (25%). These are all specific for modern Crimean fauna that indicate conditions similar to the present climate. One shell of hydrophiles *Succinea oblonga*, one rocky and soil *Caecilioides acicula* and one freshwater form *Valvata piscinalis* were also found. The latter species is a freshwater stagnophile that prefers slow currents and lakes or other standing water basins. All of these species indicate that there was a water basin close to the site. The general composition of the sample enables us to reconstruct an intrazonal type of forest-steppe landscapes, specific for floodplains or river valleys of semi-arid zones.

Summarizing the malacofauna data of Unit F in the middle of the sequence, it should be mentioned that both assemblages analyzed can be attributed to the interstadial type because they include a broad enough diversity of specimens and ecological groups (tabl. 1 and fig. 1). Strong similarity in the composition of the Unit F assemblages suggests that both represent short time periods and probably reflect different stages of faunal evolution within a single interstadial.

Perforated shells

As mentioned, many shells from Units H, G and F at Siuren I were perforated by humans. A special analysis of the perforations was conducted to identify similarities and differences in hole-making techniques and in use of snails by different Aurignacian groups for making ornaments. The Aurignacian people preferred to work with the shells of marine and freshwater mollusks, which are thicker and harder in comparison with the shells of the snails. From 32 shells with perforations, 28 are freshwater mollusks (*Theodoxus transversalis*, *Th. fluviatilis* and *Lithoglyphus naticoides*), two belong to marine species (*Apporhais pes pelicani* and *Gibbula maga albida*) and another two are snails (*Helix lucorum taurica* and *Helicella dejecta*). Most of these shells were used as necklaces, usually involving one, and more rarely, two small perforations. Bonch-Osmolowski (1934) and Vekilova (1957) also found similar shells of marine and freshwater mollusks with perforations.

Archaeological Units H and G include five modified (drilled) shells, which belong to *Theodoxus transversalis* (2), *Apporhais pespelicani* (1), *Helix lucorum taurica* (1) and *Helicella dejecta* (1). The *Apporhais* shell is the biggest in the assemblage (height 3.4 cm, including shell height 2.8 cm and aperture 0.6 mm, and width 2.2 cm); it has one large perforation (4 x 3 mm). It is clear that piercing and rubbing, mainly from the internal part of the shell, created this perforation, because the external margins of the hole are sharper and rough. The internal margins of the perforation are very fine, well-smoothed, serving as a good indicator that the shell was used as a necklace (or amulet?) for a long time, possibly being hung on a narrow skin belt. The perforations in *Theodoxus* shells were made in the same way. There are two perforations in each shell and both of them are much smaller (2 x 1.5 mm) than the *Apporhais* shell. It should be also noted that the exterior of both shells of *Theodoxus* are very finely smoothed and has a small slip of red ochre. It is difficult to identify the real origin of the perforation in the snail shells. It is quite possible that these perforations are natural, since the shells of continental mollusks such as *Helix* and *Helicella* are very fragile and sometimes natural factors (for example, wind or water streams) can also cause their breakage. The margins of these perforations are more pointed, sharp and acute, without any evidence of rubbing or smoothing.

Archaeological Unit F includes 27 modified shells. The most interesting of these is clearly is the shell of marine mollusk *Gibbula maga albida*, found in sub-level Fa2 and containing two small perforations each about 2 x 2 mm. The shell's exterior surface is very finely smoothed and colored red by ochre. The *Gibbula* shell also retains its initial natural linear form and pattern, making it a very beautiful ornament, considered one of the most attractive marine mollusks of the Black Sea. All of the other modified *Theodoxus* and *Lithoglyphus* shells from Unit F have one or two small perforations (usually not larger than 2 x 1.5 mm) and some are also colored by ochre. A few freshwater shells were found in the fireplaces, which is why they are black and also very fragile. The same technique of drilling and piercing from the interior part of the shell, with subsequent rubbing and extending the initial perforation from the exterior part of the shell, was used. In general, the hole-making technique for both archeological units are very similar and it is impossible to distinguish any significant differences, partially because the initial margins of the holes were latter worn smooth by the skin belt or the rope of the necklace. It should be also noted that among the mollusks species at Siuren I, none are edible and thus none of the species, including those with modified shells, were used as food sources.

Correlations and conclusions

Despite the fact that in some samples of snails from Siuren I, the proportion of xerophitic elements is high or even predominant, they does not necessarily indicate the predominance of xerophitic steppes near the site. When reconstructing paleolandscapes on the basis of snail fauna, it should be taken into consideration that xerophile species are the most productive among snails. Their strong shell ensures good preservation and very abundant representation in the fossil faunas. Due to both these factors, xerophile species usually constitutes the basis of many fossil assemblages, but much more informative are the other ecological groups of snails which are usually in the minority, but better reflect the real state of the surrounding landscape. Being rarely widespread, they are also in the minority in modern landscapes. Most inhabitants of hydrophiles, forest, forest-steppe, rocky and soil ecological groups of snails have a very fragile shell and are thus less well-represented in the fossil assemblages. These groups are very important for evaluation of sediment age and regional correlations.

As seen in the diagrams (fig. 1), the specimen composition of the mollusk assemblages of Unit F differs significantly from those of Units H and G. Compared with the highly uniform steppe assemblages of Unit H and the lower part of Unit G (level Gd), proportions of forest-steppe and fresh water forms clearly increase and the proportion of xerophiles and meadow steppe species decreases in the fauna of Unit F. These differences suggest that these units were deposited under different climatic conditions. There are two possible versions for this hypothesis: a) these assemblages may correspond to two different interstadials; and b) they represent different stages of faunal evolution within a single interstadial. It is clearly shown that warm species predominate in all samples and in most samples cold-loving species are absent. Only one such species was found (*Columella edentula* - 1) in the sample from sub-level Gc1 of Unit G.

Comparison of the snail assemblages from Siuren I with other fossil fauna samples in the Crimean region demonstrates that the fauna from Siuren I is younger than those from Karabi-Tamchin and Starosele (Mikhailesku 1999, figs 5-1, 5-2, 5-3 and 5-4, p. 109). The malacofauna assemblages and the diagram structure of Siuren I do not correlate with the diagrams constructed for the Karabi-Tamchin and Starosele samples, because they represent different ages and partially different groups of mollusks. The snails from Units H and G-H of Siuren I are in part comparable by their evolutionary level and assemblage structure with the youngest fauna from Kabazi II, Unit II (Mikhailesku 1999:105-106). Among all of the fossil snail faunas studied in the Crimean region, these assemblages are evolutionarily closer one to another, but are not equivalent. It is probable that they reflect two neighboring stages of snail evolution during the Last Glacial, but they are also not very similar in ecological aspect. These faunas reflect different ecological niches and evidently different climatic conditions. Representing a stadial type of fauna, the assemblage from Unit II at Kabazi II is much older and colder than the assemblages from Units H and G at Siuren I, which is an interstadial type of fauna, reflecting warmer and more humid conditions. The differences in the ecological structure of these faunas, including more xerophitic elements in the Kabazi II fauna, can be explained by drier climatic conditions, higher hypsometric position and sunny slope exposition at Kabazi II.

As seen in the diagrams (fig. 1), the mollusk assemblages from Siuren I indicate the predominance of forest- steppe and meadows landscapes around the site, also in good agreement with the palynological data of pollen zone XIII from archeological horizon -195 at Kabazi II. Pollen zone XIII indicates the gradual expansion of arboreal vegetation from refugia, including the expansion of hornbeam, and later oak and other broadleaved trees (Gerasimenko 1999:134). The predominance of forest-steppe and meadow landscape inhabitants in many snail assemblages at Siuren I serve as a good indicator that the main sequences of this site correspond to interstadial periods and were deposited in favorable environmental conditions, with a relatively warm and humid climate. The forest-steppe landscape is common in the Crimean foothills during the Arcy and Maisières interstadials and absent in the preceding and subsequent stadials of the Würm Interpleniglacial with cold and arid steppe landscapes (Gerasimenko 1999:138-139).

In general, the malacofauna records are in good agreement with the micro- and macro-mammal fauna data for Siuren I (López Bayón 1998; A.K. Markova pers. comm. 2002), as well as with stratigraphic, chronological and archaeological data; they confirm correlations of Siuren I with the Arcy (ca. 30000 years BP) and Maisières (ca. 29-28000 years BP) interstadials of the Last Glacial (Demidenko & Otte 2000-2001:139). Taking into consideration the significant differences in the composition of the mollusk assemblages for Units H-G and F, it is quite possible that both of these interstadials may be represented. It is hoped that further analyses and data obtained by other methods, including absolute dating, geological data, pollen, micro- and macro-mammals data will clarify this hypothesis.