1.11. THE HISTORY OF A LITTLE RIVER OF THE UPPER-KISKUNSÁG (HUNGARY) FROM THE ICE-AGE TO NOWADAYS

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1.11.1. INTRODUCTION

Malacology, the science which studies the life of the mollusks, is particularly suitable to study the changes of the environment. The snail, which is a well-fossilizing organism, is an excellent bioindicator even after it's death. Upper-Kiskunság is a historical region of the Danube-Tisza Interfluve. The center of it is Kunszentmiklós.

The history of the river Bakér is inseparable from that of Kunszentmiklós, the "capital" of the Upper - Kiskunság. Our ancestors from the Bronze and Sarmata ages settled down at its bank, and so did the Hungarians from Árpád's age, and founded the old settlement which became the town of our time. Until the 1950s the river had a considerable size. The middle of the river-bed was dredged regularly. The big drought of the 1970s caused the decrease of the water-output. The river-bed was not looked after any more. In 1985 most of the river flowing through the town was covered, at a point even totally embanked. The water became swampy, muddy, and grown over by plants. At the lower part of the river the inflowing organic materials from the farmers' houses cause an extremely high burden (pollution) (Szabó, 1998).

1.11.2. MATERIAL AND METHODS

This paper contains results of malacological examinations of 25 years. The fossil examinations were done in 1978, at the upper part of the river Bakér, in the walls of a former sand - mine. I sifted ten liters of material from each "snail - layer". For the classification I asked for Dr. Endre Krolopp's help, who is one of the best experts of this science.

For the recent - examinations I used the quadrate - methods. When treating the data, to make the comparison easier I used the dominance-degrees of the species as basic data. For the comparing analyses I used mathematical-statistic methods, such as cluster analysis with Czekanowski index, Shannon-Wiener's diversity and the basic works of Lozek and Frömming (Szabó, 1994a-b).

1.11.3. RESULTS AND DISCUSSION

At the fossil examinations 36 mollusk species turned up. Among the data I include the *Vallonia* and *Vertigo* species, living near the bank and demanding constant wet; and the *Chondrula*, which endures drought, and was carried in by flood. Out of the five layers the two lower ones show the features of the early Pleistocene, the upper ones show the features of the late Pleistocene. The different species appearing from the different layers show the variety of the climate: those from the lower streaks show that in the beginning the climate was much warmer than nowadays; the middle streaks show much cooler climate as compared to the upper layers which, again, show warmer climate. Quite interestingly *Chorbicula fluminalis* also came to light. This species is the leader fossil of the second phase of the Würm. According to our present-day knowledge this streak was the highest where it came to light. The presence of the *Theodoxus danubialis, Theodoxus transversalis* and *Lithogliphus naticoides* species is also interesting, which refers to the assumption that Bakér was a rapidly flowing river that time. The *Gyraulus riparius,* which appeared in the higher streaks, is a typical standing water and marsh-living species.

Fossil and recent malacological examinations at the upper part of the river Bakér (% degrees of dominance)

	species	I	II	III	f 1	f 2	f 3	f 4	f 5	1975	1985	1998
1	Acroloxus lacustris	S	S	T						2,6		
2	Anisus spirorbis	O	Pp	T	5,21	6,52	3,73	11,6	6,87	25,7	38,4	78,4
3	Anisus vortex	O	SP	E					0,62			
4	Anisus vorticulus	H	S	O		0,43						
5	Bathyomphalus contortus	H	SP	O			0,46					
6	Bithinia leachii	O	P	O	9,21	9,13	10,74	13,25	6,25			
7	Bithinia tentaculata	O	FS	O	6,26	20,43	14,01	18,28	5,62	8,79	4,58	
8	Chondrula tridens	H	X	T					1,25			
9	Cobicula fluminalis	S	F	O		0,43						
10	Fagotia acicularis	O	F	O	0,54	0,43	0,93		0,62			
11	Gyraulus /Armiger/ crista	H	S	O	8,67	3,91	3,27	4,41	7,5	0,54		
12	Gyraulus albus	O	S	E	8,44	5,65	4,67	7,18	2,5	3,25	1,25	
13	Gyraulus laevis	O	S	E	6,11	10,43	10,28	8,28	1,25			
14	Gyraulus riparius	P	FS	O	0,27		0,46	1,1	1,25			
15	Hippeutis complanatus	S	S	O				0,55		0,54		
16	Lithoglyphus naticoides	O	F	O			1,4	1,65				
17	Lymnaea /Galba/ truncatula	H	SPPp	E					1,25	0,54		
18	Lymnaea /Radix/ peregra	O	FS	T		0,86	0,46	0,55	0,62	17,9	25,8	18,6
19	Lymnaea /Stagnicola/ palustris	H	P	E	8,97	2,6	3,73	4,97	1,87	2,34	0,45	
20	Lymnaea stagnalis	O	S	E	10,84	2,17	1,4		0,62	5,78	0,45	
21	Pisidium amnicum	S	FS	O			0,87	0,55	1,25			
22	Pisidium sp.	S	S	O	0,81	1,13	2,33	8,81	30,62			
23	Planorbarius corneus	O	S	E		0,43				1,25	0,45	
24	Planorbis planorbis	H	P	O	8,67	13,47	24,29		4,37	14,3	6,4	
25	Segmentina nitida	O	P	O				0,55	1,25	2,5	4,4	
26	Succinea /Oxyloma/ elegans	H	P	T				1,1				
27	Succinea oblonga	H	H	E	1,35	3,47	1,86	0,55	8,75	12,3	17,9	3
28	Theodoxus danubialis	H	F	O		0,86						
29	Theodoxus transversalis	H	F	O			0,46					
30	Vallonia enniensis	S	H	E	0,54	0,43	0,64	0,55	1,25			
31	Vallonia pulchella	S	H	E	1,35	0,43		2,2	1,87			
32	Valvata cristata	S	P	E	3,79	2,17	2,33	2,2	2,5	1,52		
33	Valvata piscinalis	S	FS	O	8,13	8,69	8,41	7,18				
34	Valvata pulchella	S	SP	E	10,56	5,65	3,27	4,41	6,87			
35	Vertigo antivertigo	S	H	E					1,25			
36	Vertigo pygmea	S	H	E					1,87			

I = nourishment type , II = ecological group, III = temperature demand

During the recent examinations one more species turned up, the *Acroloxus lacustris.* It might have lived here formerly, but it is very difficult to find. The recent mollusk species turned up from Bakér are almost the 50 % of the mollusk fauna of the Upper - Kiskunság.

(Szabó, 1980) Most of the species turned up from the upper Pleistocene layer (25), least of them turned up at the collection in the year of 1998. (3)

I examined the diversity of living places of different ages with the Shannon - Wiener diversity (Orbán, 1995).

	Fossil layers					Recent collections		
	1	2	3	4	5	1975	1985	1998
H_S	0,86	0,89	0,91	0,88	0,87	1,05	1,30	1,73
J	0,43	0,43	0,44	0,43	0,43	0,51	0,62	0,82

(H_S = degree of diversity, J = evenness of Shannon diversity)

The examination of nourishment habits shows it balanced in the three lower layers of Pleistocene. The increase in the rate of the *saprovor* species shows the process of marshiness. There were *saprovors* only in 1975 in the recent material, then, because of the increasing accumulation of mud, which is not suitable for these snails, they disappeared. (Frömming, 1956)

	fossil layers					recent collections		
	1	2	3	4	5	1975	1985	1998
H	27,66	24,74	34,07	11,03	24,99	30,00	24,80	3,00
O	46,88	56,05	48,08	62,44	27,47	65,10	75,30	97,00
S	25,18	18,93	18,85	26,45	47,48	4,66		

(H = plant-eating */herbivor/*, O = all-eating */omnivor/*, S = detritus-eating */saprovor/*; In % degrees)

Examining the temperature demand of the species turned up we can see that there are *oligotherm* (cool water liking) species in bigger rate in the Pleistocene layers. At the recent materials the dominance of *thermophile* species increasing, in proportion to the decrease of water depth. (Frömming, 1956)

	fossil layers					recent collections		
	1	2	3	4	5	1975	1985	1998
T	5,21	7,38	4,19	13,25	8,74	46,2	64,2	97,00
E	51,95	33,43	28,18	30,34	32,47	27,00	20,50	3,00
O	42,56	58,90	67,63	56,33	58,73	26,60	15,40	

(T = thermophyl, E = eurytherm, O = oligotherm; In % degrees)

I examined the basic data according to the ecological classification of Lozek. (In %)

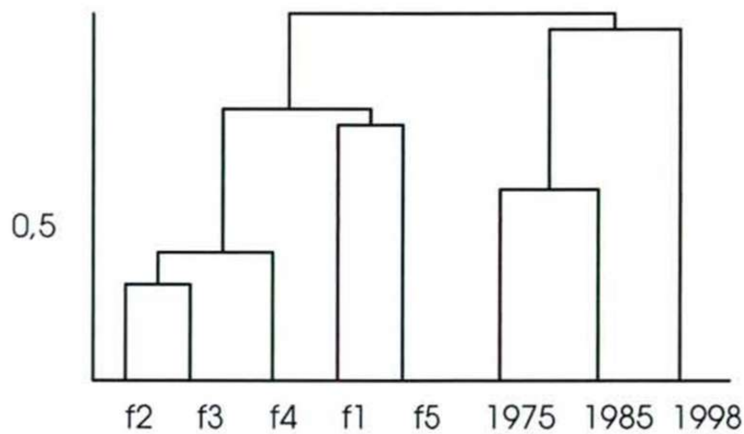
	fossil layers					recent collections		
	1	2	3	4	5	1975	1985	1998
F	0,54	1,72	2,79	1,65	0,62			
FS	14,66	29,98	24,21	27,66	8,47	26,7	30,4	18,6
S	34,87	24,15	21,95	29,23	42,49	14,00	2,15	
SP	10,56	5,65	3,73	4,41	7,49			
P	30,64	27,37	41,09	22,07	16,24	20,60	11,3	
Pp	5,21	6,52	3,73	11,60	6,87	25,7	38,4	78,4
SPPp					1,25	0,54		
H	3,24	4,33	2,50	3,30	14,99	12,30	17,90	3,00
X					1,25			

(F = flowing-water, FS = flowing - standing water, S = standing water, SP = standing water - marsh, P = marsh. Pp = marsh - puddle living, SPPp = puddle - living, H = wet demanding, X = drought suffering; In % degrees)

In the Pleistocene layers, although in low degrees, the flowing water species are present. It refers to moving water. The presence of several standing water and marsh living species, however, refers to the riverside reeds and seaweeds of the bending river. In their rations layers No. 2-3 and No. 4 are similar, as well as layers No. 1 and No. 5.

Flowing-water species are not included in the material of the recent collections and gradual increase can be seen in the dominance of the most common snails (*Linnaea peregra, Anisus spirorbis* . Now the total reign of the puddle-living *Anisus spirorbis* is typical (Lozek, 1965).

Comparing examinations of the collected materials were done with the correlative method (Index of Czekanowski), then, using these data, I did Cluster - analysis. (Szabó 1994b). Analyzing the dendogram of the Cluster - analysis it is seen that the Pleistocene and recent material is isolated. More closely connected are layers No 2. and No. 3. To this layer No. 4 is closely connected. Then, at a low level come layers No.1 and No.5. In recent materials there is a loose connection between the materials from the year 1975 and 1985. To this is connected, at a very low level, the material from the 1998 collection.



1.11.4. CONCLUSION

The history of the river Bakér ended with the XXth century. But, with good will, it could be living water again . I believe that, with appropriate division of water from the canal XXX, the problem of water-supply, by derging the problem of open-water could be solved. This will be the task of the XXIst century.

1.11.5. SUMMARY

This paper presents the history of a river of the Upper - Kiskunság (HUNGARY) from the Ice - Age to nowadays. Fossil examinations show the paleoecological state of the River Bakér. The turning up of *Corbicula fluminalis* is a special value of the fossil malaco-fauna. Recent examinations follow the total decline of this little river in the last three decades of

the XXth century. Now, in the bed of the former river only wide - suffering, puddle -living species live.

1.11.6. REFERENCES

Frömming E. (1956): Biologie der mitteleuropaischen Süsswasserschnecken. - Berlin. (Dunker & Humbolt) 1-313.

Lozek, V. (1965): Entvicklung der Molluscenfauna der Slovakei in der Nachetszeit.- Informations. Bericht der Landwirschaftlichen Hochschule, Nitra L. 1-4.: 924

Orbán S (1995): Biometria, - Eszterházi Károly Tanárképző Főiskola, Eger 1995 - manuscript

Szabó, S. (1980): Adatok a Felső-Kiskunság vizipuhatestűinek elterjedéséhez és mennyiségi viszonyához, - Soosiana 8:55-64, 1980

Szabó, S. (1994a): Data to malacologic valuation of Hungarian waters,- Mal. Táj. 13:51-53

Szabó, S. (1994b): Hidrobiológiai vizsgálatok vizicsigák segítségével,- ELTE szakdolgozat 1-133. Budapest 1994 - manuscript

Szabó, S. (1998): The enviromental state of the waters in the Felső-Kiskunság (Hungary) from the ice-age to nwadays in mirror of the malacological studies, - IIIrd Hidrology Conference: The water and the protection of aquatic enviroment in the central basin of the Danube, volume II. 250-257, Cluj-Napoca, Romania