# Bioaccumulation of certain toxic metals by fish and unionidae shells in River Someş/Szamos[1]

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***Abstract***

Thsis study presents the occurrence of certain toxic metals (Al, Cu, Zn, Pb, Mn) in *Unio crassus* and *Leuciscus cephalus* species in the „united" Someş/Szamos river.

Keywords: Someş/Szamos rivers, pisces, mollusc, toxic metals

## *Introduction*

The heavy metal content of organisms shows the degree of pollution of the water.

As a result of the research in the river Criş/Körös. Valleys we discussed in some previous papers A. Sákány-Kiss et al., 1997/a, b the role of the fish and shells in the bioaccumulation of certain heavy metals. Based on this research we concluded - especially in the case of shells -, that populations with an apparently good vitality have a high degree of heavy metal content. So high that it can cause the extinction of these populations. Therefore we believe that the survey of a river must also include analysis of heavy metal content in organisms.

Unfortunately in the case of river Someş/Szamos we had the possibility to examine the metal content of only a few samples of shells and fish.

## *Materials and methods*

Taking into consideration the fact that the Someşul Mic and Someşul Mare rivers are very polluted, they do not contain significant shell populations. This is the resason why we collected shells for examination only from the middle section (Sălsig - Păuleşti) of the „united" Someş. First of all we have examined the *Unio crasus* species, the specimens of wich we have found in every sampling site.

Exception being only the Sălsig sampling site, where the low abundance of shell populations did not permit us to collect more specimens of one species, so this sample is a mixed one: *Unio crassus - Anodonta cygnea.* In the case of shells we have determine separately the metal content of muscle and gills.

[1] The first name is Romanian, and the second Hungarian

As for fish we have examined a single species - *Leuciscus cephalus* - in the „united" Someş. This species was easy to capture in every sampling site, and the other reason why we have opted for it is, that it is a predator, and this fact predestinates this species to the high metal content Svobodová and Hajtmánek 1985.

The fish were eviscerated and cleaned the same way as it is done for human consumption. The material prepared in this way was dried at 100 oC in the site. Therefore our results are related to dry material.

The determinations of the metal-content were performed in the labs of the Department of Inorganic and Analytical Chemistry of Kossuth Lajos University, Debrecen, Hungary using inductively coupled plasma atomic emission spectrometry method.

## *Results and discussion*

The shell samples show that metal content of the gills is higher than that of the muscles in every case. The results (especially the high copper content of the Păuleşti sampling site) shown in Figure1. and Table 1. show that the residual water resulting from non-ferrous metal extraction and processing is damaging the living organisms of the Someş/Szamos. We couldn't take samples from the Pomi sampling site right after the confluence with Lăpuş river which is the most polluted sector as there are no shells living there.

In spite the fact that Pomi is at a distance of 80 km from Baia Mare and most of the heavy metals settle in the sediment, the high zinc content of shells indicates the polluting effect of residual waters coming from the industrial establishment of Baia-Mare.

In every sample (especially in the gills) the mangan content is high, which has to do with the local geological conditions. We decided to measure the mangan content as well, because according to Serfőző et al. 1995 the bioaccumulation of this metal can offer protection against the toxic effects of heavy metals.

**Table 1. Metal content of shells in the "united" Someş river**

| Sampling Sites | Al | Cu | Pb | Zn | Mn |
|---|---|---|---|---|---|
| | (mg / kg weight) | | | | |
| Someş-Odorhei Uc-Ac; I | 9.5 | 2.5 | 2.5 | 68.5 | 180.5 |
| Someş-Odorhei Uc-Ac; K | 28 | 2.5 | < 2,71 | 272 | 3750.5 |
| Ţicău Uc; I | 10 | 2 | 0.5 | 82.5 | 125.5 |
| Ţicău Uc; K | 150 | 6.5 | 3.5 | 312.5 | 5787 |
| Sălsig Uc; I | 0.5 | 2.5 | 0 | 89.5 | 60.5 |
| Sălsig Uc; K | 61.5 | 6.5 | 0.5 | 259 5 | 4567 |
| Păuleşti Uc; I | 2.5 | 20 | <1,18 | 137.5 | 381 |
| Păuleşti Uc, K | 55.5 | 288 | <1,22 | 913.5 | 4790.5 |

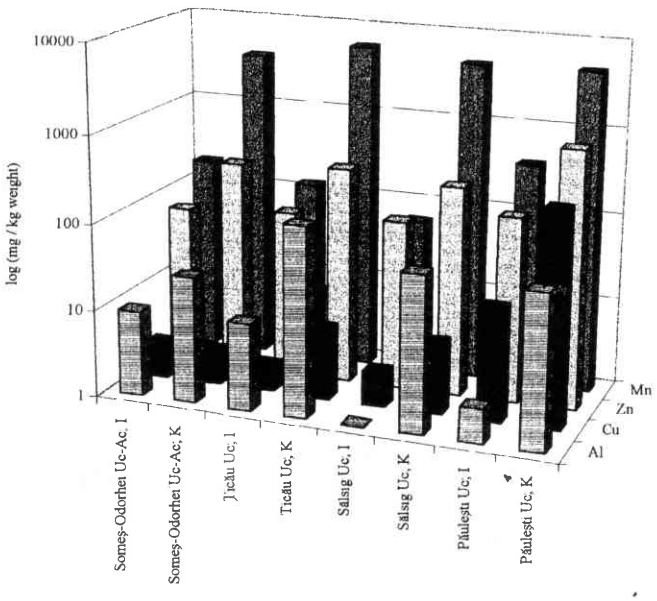


Figure 1.

The higher copper, zinc and aluminium content of fish in the lower portions of the river (Table 2., Figure 2. and 3.) also indicate the polluting effect of the industrial establishments to be found along the river. However, the degree of bioaccumulation is significantly lower in fish than in shells as they are more mobile organisms. In addition this mobility of fish also makes it more difficult to determine the degree of pollution of a certain sector.

**Table 2. Metal content of *Leuciscus cephalus* in the "united" Someş river**

| Sampling Sites | Cu | Mn | Zn | Al |
|---|---|---|---|---|
| | (mg / kg weight) | | | |
| Ţicău | 2 | 1.5 | 82 | 0 |
| Sălsig | 7.5 | 9 | 92.5 | 13.5 |
| Pomi | 4.5 | 46 | 86.5 | 138.5 |
| Păuleşti | 8 | 73 | 103 | 120.5 |

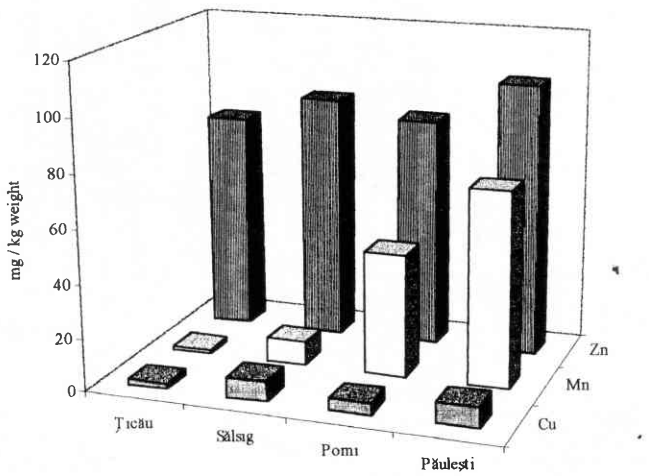


**Fig. 2. Cu, Mn and Zn content of *Leuciscus cephalus* in the "united" Someş river**

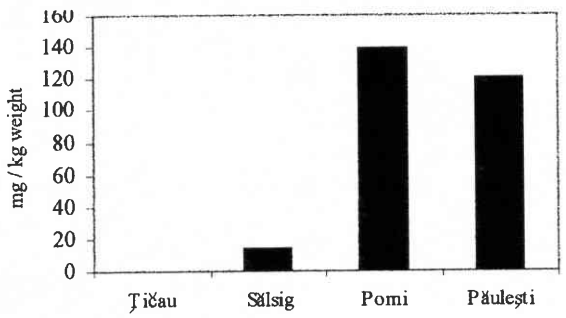


**Fig. 3. Al content of *Leuciscus cephalus* in the "united" Someş river**

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