Structure and aspects of dynamic of the unionid associations of the Crişul Alb/Fehér-Körös[1] river at Ineu

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Abstract

The author examined the dynamic of growth of the Unio crassus species in Crişul Alb/Fehér Körös river before Ineu. In 1994 there were lifted out 800 samples of a 1 m wide cross-section of the river, they were numbered and then put back into the river. In 1995 there were found numbered samples. It was stated that the rhythm of growth slowed down in the 3rd-4th year of their life, which coincides with their sexual maturalization. The growth of the older age-classes is slow, it is only the rhythm of growth of weight that remains fast, owing to the thickening of the shells.

Keywords: Crişul Alb river, Bivalvia, Unio crassus, dynamic of growth

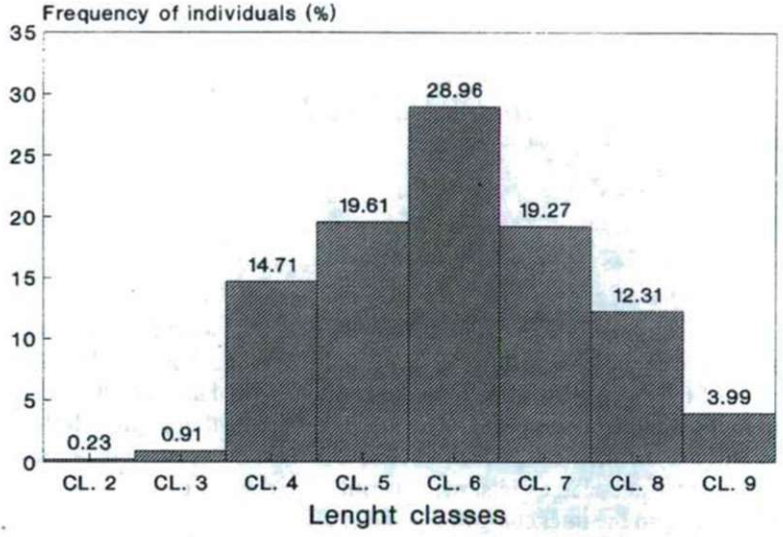
Introduction

Only a few studies have been realised about the Romanian rivers that treat the different structure and dynamic aspects of the Unionid associations. Tudorancea and Gruia (1968) studied the distribution and the annual increase of the *Unio crassus* population in the river Nera, determining the age of the specimens based on their growth-lines and on the length groups.

Due to the very many unregulated growth lines of the *U. crassus* species the age determination, based on these lines, is very difficult. Our anterior study (Sárkány and Csenteri, 1983) presents the fact that growth represents only a single oscillation more evident in the sexual maturation period, but the above mentioned authors insist upon their statement according to which there would exist greater oscillations determined by the particularities of the environment. Obviously the local populations may have specific growth rhythm but the studies performed up to this date are not relevant as they are based

1 The first name is Romanian, and the second Hungarian.

Fig. 1. The frequency distribution of the individuals, belonging to *Unio crassus* upstream of Ineu (Crisul Alb River)

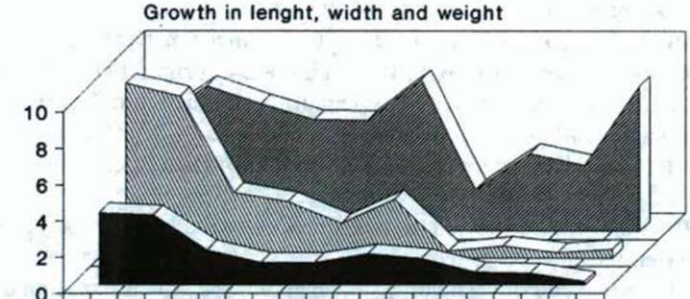


on age groups (mentioned above) or on the statistically chosen length classes, without the follow-up of the real annual growth of the specimens. Because we were not satisfied with our results on the river Niraj (1983) which were obtained with these methods, we applied to the method of marking and re-collecting of the specimens. Similar studies were carried out on the river Thames (Negus, 1966) demonstrating a decrease in the growth rhythm related to the length of the age classes and a uniform increase in weight of the valve as well as of the living part.

Materials and methods

On 15 July in 1994 on the Crisul Alb upstream at Ineu the spatial distribution, the abundance and the biomass of the Unionid associations were studied in a 1 m wide cross-section and divided in square meters. All the shellfishes were collected from each sampling surface (all in all 958) and all the specimens were determined. The biometrical parameters were determined: length, width, live weight with water closed in the paleal cavity. Eight hundred specimens of *Unio crassus* were marked with dental drill each of them getting a number in increasing order. The Unionid species were replaced to their place

Fig. 2. Growth in lenght, width (mm) and weight (g) of *Unio crassus* individuals related to lenght classes, upstream of Ineu.



L. classes (mm)	38,5	43,5	48,5	53,5	58,5	63,5	68,5	73,5	78,5	83,5
weight (g)	6	8	7	6.14	6.11	8.35	2.31	4.3	3.66	8
lenght (mm)	9.6	8.9	3.63	3.12	1.92	3.25	0.37	0.66	0.3	0.5
width (mm)	4	3.87	1.93	1.24	1.25	1.72	1.47	0.72	0.66	0.2

of origin. In the autumn of 1994 we controlled marked specimens without disturbing the others. In October 1994 all the specimens were collected from these surfaces.

Results and discussions

The river is 25 m wide at Ineu site. The spatial distribution of the Unionid species is of an aggregated type (ID = 60,52). With Student test I verified the probability of deriving from the standard unit, thus the hypothesis of spatial distribution was determined to the 99,999% (t 206,83) level of certainty. Still these organisms occupy almost all the surface of the river-bed except for the bank zone, from the 25 sampling surfaces the shell were not present only in 4. The associations present an appreciable abundance, having a medium density of 63 ind/m^2 (the maximum value 138 individs/m^2). In the stony river bed we found specimens embedded to 15 cm deep, which means that in the squares with higher abundance we found three superposed levels of specimens. We consider that this appreciable density is due to the favourable conditions: adequate water speed (approximately 20 cm/sec) abundance of the tropic particles and an optimal substratum for

fixing. The medium biomass of the Unionid species is 1697,34 g /m^2. The composition in percentage of the Unionid associations at this level is the following: Unio crassus (98,45%), Anodonta woodiana (0,44%), Unio tumidus (0,22%), Pseudanodonata complanata (0,22%) and Unio pictorum (0,11%).

From the 958 collected specimens 800 specimens of Unio crassus were marked and weighed, then they were placed back to their place of origin. Fig.1. represents their length class structure. The varying domain of length was divided into 9 classes each having 9,63 mm. It is marked an approx. normal individual frequency distribution, with a maximum of 28, 90% for the 6th class (53,45 - 63,08 m) approximately corresponding to the age of 5-7.

In 1993 the studies showed the sex structure of the Unio crassus population that was 52,2% masculine and 45,8% feminine.

In October 1994 investigating the marked specimens we found that they were embedded in the sediment and did not move further than 1-2 m from the place they had been settled. This time we found a mortality of 10% in the examined section, from these 4 specimens were marked. Probably in the meantime many shells were washed away by the current. Here we found a great number of unmarked specimens (approx. 40%) which means that the neighbouring specimens quickly occupied this place.

In 1995 during the research, from a 20 m wide section, marked around the previous section line we collected 98 living specimens and 40 empty and marked valves. The majority of the samples we could find were situated ≈ 3 m far from the original section. Only one specimen was found at 6 m downstream to the reference line. Because the river sediments were profoundly modified by the spring and autumn floods, we suppose that a great part of the marked but not found specimens had been washed away. We could also observe a mortality of approx. 15% (the specimens must have died one or two days ago). Probably this was caused by the toxic substance pollution. We state that in 1994 high zinc and copper concentrations were found in the studied shell-fishes. During the gathering (1995) we observed as well petroleum spots floating on the water surface.

The dynamic of growth in weight, length and width (Fig.2.) is represented by length classes of 5 mm each. One can notice that the length, width and first of all, the weight increases are the most powerful in the case of the samples up to 40 mm length (the first two classes). In the case of the following class the rhythm of growth in length and width decreases to its half, but the weight increase shows a slight descent up to the class of 60 mm. This slow rhythm coincides with the sexual maturity of the specimens; then an acceleration in weight and length can again be noticed, the width increase remaining a little slower. The samples longer than 70 mm show again a significant increase in weight, mainly as a result of the valves which become heavier and heavier; while the growth in length and width remains only irrelevant.

Conclusions

Our findings resulting from the research on the Crisul Alb coincide with those of Negus (1966), according to which the rhythm of growth slows down with age of the Unionid species. Our research has also examined younger specimens than the above mentioned author. Thus we found that the rhythm of growth of the unionids shows a significant descent during the sexual maturity period.

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