

A barrier - corridor study: the effect of dike construction on leech communities of the Danube

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RESUME

A la suite de l'activité humaine les territoires actuellement inondés sont non seulement moins étendus que ceux du siècle dernier, mais leur structure a également subi des modifications. Parmi les travaux hydrauliques de régularisation du lit, la construction des épis se présente comme la plus fréquente. Son influence est sensible en premier lieu sur les groupements et associations de la zone littorale. Des deux cotés de l'épi, on constate un dépôt de matières en suspension, qui permet l'installation des macrophytes aquatiques.

Ce changement pourrait influencer d'une manière positive les groupements de sangsues. C'est l'hypothèse avancée comme objectif de l'étude de la section hongroise du Danube, longue de 420 km.

Par rapport aux études menées dans les années 60, on constate la remontée vers l'amont de sept espèces (*Glossiphonia paludosa*, *Glossiphonia verrucata*, *Glossiphonia concolor*, *Cystobranchnus respirans*, *Hirudo medicinalis*, *Erpobdella testacea*, *Trochaeta bykowskii*). Actuellement on n'a pas encore signalé la présence de *T. bykowskii* en Autriche, mais vu la rapidité de sa propagation on peut s'attendre à son arrivée en Europe Occidentale par la voie du canal Danube-Rhin-Maine.

Lors de l'étude des substrats (pierres, bois, macrophytes aquatiques) je suis arrivé à déterminer le rôle des épis dans la propagation de ces sangsues. Les individus juvéniles d'*Erpobdella octoculata* menacée par les prédateurs, qui préfère les macrophytes aquatiques assurant des microhabitats. Ainsi, les épis favorisant la prolifération de ces microhabitats modifient-ils les groupements de sangsues de la zone littorale.

ABSTRACT

The construction of dikes is a customary water engineering manipulation to narrow rivers to aid navigation. It however causes a considerable change in the structure of littoral communities. The silting-up of the bank downstream of the dike, because the slower velocity of the water, provides an opportunity for macrophyte colonization. As a consequence even more material is laid down in those areas.

Hirudinea is one of the groups, which can effectively use these habitat changes to enlarge its distribution area. This hypothesis was investigated along the 420 km long Hungarian Danube stretch based on previous records from the 1960's. Comparing our data to previous records both the number of species and the number of individuals collected increased. Seven new species (*Glossiphonia paludosa*, *Glossiphonia verrucata*, *Glossiphonia concolor*, *Cystobranchus respirans*, *Hirudo medicinalis*, *Erpobdella testacea*, *Trochaeta bykowskii*) were found in our surveys. *T.bykowskii* seems to migrate upstream, and though it has not been reported from Austria, it will soon colonize Western Europe through the Danube-Rhine-Maine canal if it continues to spread with the same speed.

Studying the Hirudinea communities of different substrates (stone, wood, macrophyte stand) macrophyte colonies turned out to host a significantly larger number of young *Erpobdella octoculata* individuals. By providing a remarkably more variable microhabitat for a most vulnerable developmental stage, dikes have a detectable effect on the distribution of Hirudinea species.

Keywords: leeches, colonization, distribution area, dike, habitat changes, corridor.

Introduction

Human activity changed the landscape in Central Europe during the past century. These changes include not only the disappearance of 90% of Hungarian wetlands (Rakonczay 1992) but considerable alterations in the structure of the remaining 10% as well. One of them is the construction of dikes, which is a customary water engineering manipulation to aid navigation. It mostly changes the structure of littoral communities. The silting-up of the bank downstream of the dike, because of the slower velocity of the water, provides an opportunity for macrophyte colonization. As a consequence even more material is laid down in those areas. Hirudinea is one of the groups, which can benefit from these changes. This hypothesis was investigated along the 420 km long Hungarian Danube stretch based on previous records from the 1960-s.

Methods

Samples were collected at 57 sites since 1988 from along the Danube between Rajka (1849 river km) and Mohács (1447 river km) including the sites of Soós's investigation (1967). Samples were taken according to Kosel's method and determined after Sladeczek & Kosel (1984) and Sawyer (1986). Three substrates on which leeches were mostly found were distinguished: stones, macrophytes and wood.

The collection time varied between twenty and sixty minutes according to the abundance of leeches. The Danube has mostly got middle section characteristics in Hungary. There are no power plants on this section but dikes are quite numerous. Special emphasis was given to the collection from around dikes. Altogether more than 2,000 animals were collected. They were kept and determined alive in most cases. The size distribution of the dominant species on the different substrates were also investigated.

Results

Table 1. shows the occurrence of species during the surveys. Comparing our data to Soós's results (1967) both the number of species and the number of individuals collected increased (The earlier investigation was made by using all available data at that time from various collections. The total individual number was above 1,300.). There were seven new species (*Glossiphonia paludosa*, *Glossiphonia verrucata*, *Glossiphonia concolor*, *Cystobranchnus respirans*, *Hirudo medicinalis*, *Erpobdella testacea*, *Trochaeta bykowskii*) in our surveys

Table 1 - The occurrence of Hirudinea species along the Danube in Hungary before 1967 (according to Soós) and between 1988 and 1992.

	1967	1988-1992
Glossiphoniidae		
<i>Helobdella stagnalis</i>	+	+
<i>Glossiphonia paludosa</i>		+
<i>Glossiphonia verrucata</i>		+
<i>Glossiphonia complanata</i>	+	+
<i>Glossiphonia concolor</i>		+
<i>Alboglossiphonia heteroclita</i>	+	+
<i>Theromyzon tessulatum</i>	+	+
<i>Hemiclepis marginata</i>	+	+
Piscicolidae		
<i>Piscicola geometra</i>	+	+
<i>Cystobranchus respirans</i>		+
Hirudinidae		
<i>Haemopsis sanguisuga</i>	+	+
<i>Hirudo medicinalis</i>		+
Erpobdelliidae		
<i>Erpobdella nigricollis</i>	+	+
<i>Erpobdella octoculata</i>	+	+
<i>Erpobdella testacea</i>		+
<i>Dina lineata</i>	+	+
<i>Dina apathyi</i>	+	+
<i>Trochaeta bykowskii</i>		+

The dominant species did not change in twenty five years. *Erpobdella octoculata*, *Helobdella stagnalis*, *Dina lineata* and *Glossiphonia complanata* remained common along the Hungarian Danube stretch.

Figure 1. and Figure 2. shows the size distribution of two dominant species, *Erpobdella octoculata* and *Helobdella stagnalis*. While nearly 30 % of *Erpobdella octoculata* individuals were found on macrophytes less than 7 % of *Helobdella stagnalis* was collected from the same substrate.

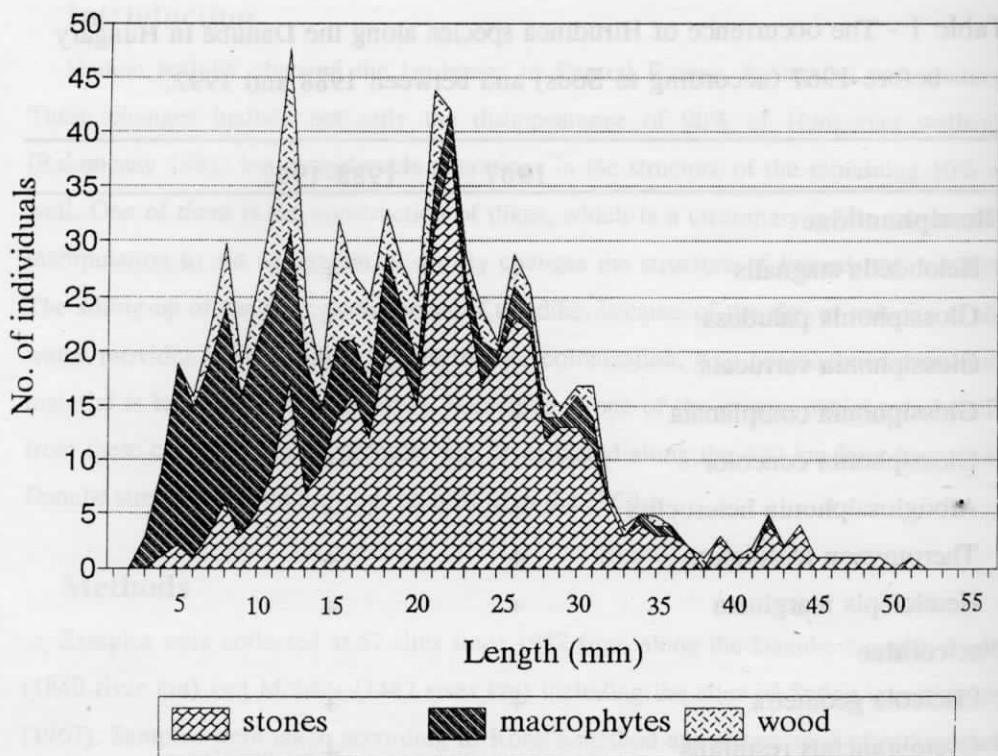


Figure 1. The size distribution of *Erpobdella octoculata* on different substrates.

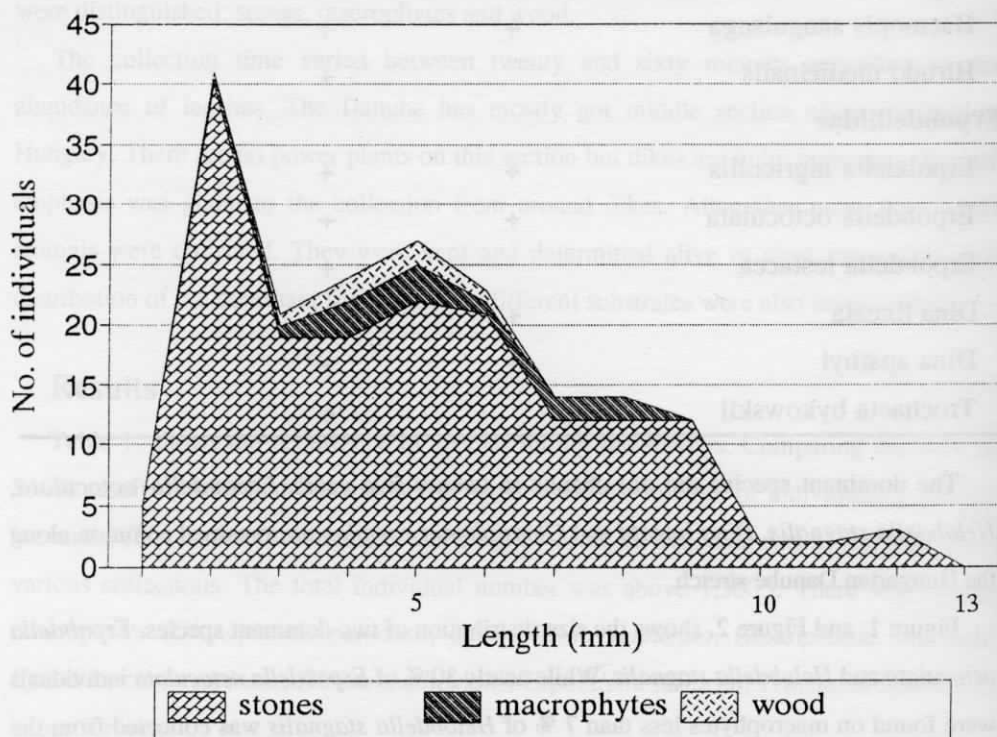


Figure 2. The size distribution of *Helobdella stagnalis* on different substrates.

Discussion

The Hirudinea fauna of the Danube in Hungary changed during the past three decades. Seven new species appeared in the area, some of them most probably due to the different methods used in the surveys. However, it also proved to be a group which can effectively use man-made habitat changes for the expansion of its distribution area as the size distribution of *Erpobdella octoculata* demonstrates. *Trochaeta bykowskii* was a species, which migrated upstream with a considerable speed. It had not been recorded from the Hungarian section of the Danube and now it is present even at the Austrian border. It can easily enter into Western Europe through the Danube-Rhine-Maine canal if it spreads with the same intensity.

Common species are predominant. *Erpobdella octoculata* occurs throughout the Palearctic region, Japan and Africa and is one of the commonest leeches in fresh water (Soós, 1966a, 1968). *Helobdella stagnalis* is present in every continent except Australia (Soós, 1969) similarly to *Glossiphonia complanata* (Soós, 1966b). *Dina lineata* is a Palearctic species (1966a). Studying the Hirudinea communities of different substrates (stone, wood, macrophyte stand) macrophyte colonies turned out to host a significantly larger number of young individuals of certain species (*Erpobdella octoculata* L.) than the two other categories. By providing a remarkably more variable microhabitat for a most vulnerable developmental stage, dikes have a detectable effect on the distribution of Hirudinea species.

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