CHIRONOMID COMMUNITIES IN DIFFERENT VEGETATION TYPES IN A BACKWATER NAGY-MOROTVA OF THE ACTIVE FLOODPLAIN OF RIVER TISZA, HUNGARY

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With 3 figures and 1 table

ABSTRACT: Our aim is to study the distribution of chironomids in five vegetation types of a backwater of River Tisza. 26 taxa were identified. The highest diversity were found in *Stratiotes aloides* dominated and marshy vegetation. The results suggest the importance of these vegetation types as mesohabitats for chironomid larvae. The structure of plants determine the composition of their chironomid communities.

RESUMO: O nosso objectivo é estudar a distribuição de quironomídeos em cinco tipos de vegetação de uma represa do rio Tisza. Foram identificados 26 taxa. A maior diversidade foi encontrada em zonas de dominância de *Stratiotes aloides* e em vegetação pântanosa. Os resultados sugerem que estes tipos de vegetação são importantes como mesohabitats para as larvas de quironomídeos. A estrutura da comunidade vegetal determina a composição das sua comunidade de quironomídeos.

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INTRODUCTION

The majority of Hungarian researches of non-biting midges referred to the sediment of open water and chironomids were collected rarely among the vegetations. Backwaters of Tisza were formed in the 19th century during the regulation of the river or as results of natural cutting (for example the Nagy-morotva). Although backwaters of Tisza are special, unique waters, a very little survey tends to their chironomid fauda. The aim of our investigation was to study the distribution of chironomids in different vegetation types of a backwater of Tisza (Nagy-morotva).

MATERIAL AND METHODS

Our sampling site was Nagy-morotva, which is located in floodplain of River Tisza, near Rakamaz and Tiszanagyfalu (21°28´34½; 48°06´46½; 10x10 km UTM-code: EU32). Quantitative sampling was carried out in August 1999 by close-and-harvest method (TÓTH et al. 2000). The sampler (Aqualex) is a cylindrical superficies made of 5-mm thick aluminium plate, with a basal area of 0.5 m^2 and a height of 1 m. The lower edge of the cylinder is sharpened. If water depth is over ca. 80 cm, an additional 1 m height cylinder section was attached to extend the original height of sampler. For the calculation of the water volume sampled water depth was measured inside the cylinder. The water inside the sampler containing organisms were removed by using a hand-net and a plastic bucket, and passed through a sieve of 0.25 mm mesh size which retains the macroscopic metaphytic organisms. The covering of macrovegetation (when it entirely developed) was approximately 90 % in the backwater. Samples were taken from five vegetation types. These were *Ceratophyllum demersum*, *Trapa natans*, *Stratiotes aloides*, *Nymphaea alba* dominated vegetation types and marshy vegetation (*Typha angustifolia*, *Schoenoplectus lacustris*, *Carex* spp.). From every vegetations five samples were taken.

Chironomid larvae were selected from the vegetation on the spot and were conserved in 70% ethanol. The preparation and identification was carried out in laboratory. Larvae were identified (when it was possible) to species level. We used the following works for identification: BÍRÓ (1981), WIEDERHOLM (1983), WEBB and SCHOLL (1985), JANECEK (1998), VALLENDUUK (1999), and SÆTHER et al. (2000). The nomenclature follows SÆTHER and SPIES (2004).

For statistical analyses we used a logaritmic transformation [log(x+1)] of the number of the individuals. Species richness, number of individuals and Shannon's diversity were compared by Kruskal-Wallis test, and discriminant analysis was used for classifying the vegetation types.

RESULTS

A total of 25 chironomid taxa belonging to three subfamilies (Tanypodinae, Orthocladiinae, Chironominae) were identified (Table 1). The most dominant subfamily was the Chironominae (21 taxa), 3 species belong to Tanypodinae and 1 species to Orthocladiinae.

The highest number of species and the highest number of individuals were found in *Stratiotes aloides* dominated vegetation type. Relatively high species richness was detected in marshy vegetation too. In addition, a large number of mining chironomid larvae (*Endochironomus tendens*, *Glyptotendipes cauliginellus*, *Glyptotendipes pallens*) was found in these vegetation types. The lowest number of individuals was found in *Ceratophyllum demersum* dominated vegetation type. The lowest number of species was found in *Ceratophyllum demersum, Trapa natans* and *Nymphaea alba* dominated vegetation types (Fig. 1A–B.). Shannon's diversity was the highest in *Stratiotes aloides* and *Nymphaea alba* dominated vegetation types and in marshy vegetation (Fig. 2). Despite apparently conspicuous differences, the Kruskal-Wallis test did not detect significant results (Fig. 1–2).

Discriminant analysis (Fig. 3) showed that 95,8% of the original groups were correctly classified. It means that the investigated vegetations were very different from each other. *Stratiotes aloides* and *Nymphaea alba* dominated vegetations clearly distincted from the other vegetations. Separations was also found in case of the other vegetation types, but it was not so conspicuous.

TABLE 1. Chironomidae taxa recorded from different vegetation types (Nagy-morotva) (STR: Stratiotes aloides, TRA: Trapa natans, NYM: Nymphaea alba, CER: Ceratophyllum demersum, MAR: marshy vegetation, 1: present, 0: absent).

	STR	TRA	NYM	CER	MAR
Tanypodinae					
Tanypus kraatzi (KIEFFER, 1912)	0	1	0	0	1
Anatopynia plumipes (FRIES, 1823)	1	0	0	1	0
Ablabesmyia phatta (EGGER, 1863)	0	0	0	1	0
Orthocladiinae					
Cricotopus sylvestris gr.	0	0	0	1	1
Chironominae					
Chironomus annularius agg.	1	1	1	1	1
Chironomus luridus agg.	1	1	1	0	1
Chironomus nuditarsis KEYL, 1961	1	0	0	0	0
Chironomus plumosus (LINNAEUS, 1758)	1	1	0	1	0
Chironomus sp.	1	0	1	0	1
Dicrotendipes lobiger (KIEFFER, 1921)	0	0	1	0	0

TABLE 1. (Cont.)

	STR	TRA	NYM	CER	MAR
Dicrotendipes nervosus (STAEGER,1839)	1	0	0	0	0
Dicrotendipes notatus (MEIGEN, 1818)	1	0	0	1	1
Dicrotendipes tritomus (KIEFFER, 1916)	0	1	0	0	0
Endochironomus albipennis (MEIGEN, 1830)	0	1	1	1	1
Endochironomus tendens (FABRICIUS, 1775)	1	1	0	1	0
Endochironomus sp.	0	1	0	0	1
Glyptotendipes cauliginellus (KIEFFER, 1913)	1	1	1	0	1
Glyptotendipes pallens (MEIGEN, 1804)	1	0	1	0	1
Glyptotendipes viridis (MAQUART, 1834)	1	1	0	0	0
Kiefferulus tendipediformis (GOETGHEBUER, 1921)	0	0	0	0	1
Parachironomus varus (GOETGHEBUER, 1921)	1	0	1	1	0
Phaenopsectra flavipes (MEIGEN, 1818)	1	1	1	0	0
Polypedilum sordens (VAN DER WULP, 1874)	1	0	1	0	1
Polypedilum cultellatum GOETGHEBUER, 1931	0	1	1	1	1
Polypedilum sp.	1	0	0	0	0

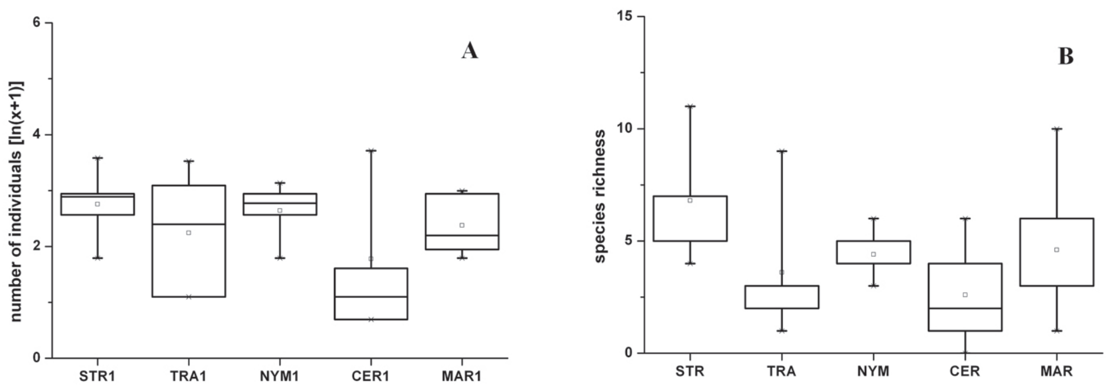

Fig. 1. Number of individuals (F=0,849; df=4; p=0,512) (A) and number of species (F=1,446; df=4; p=0,258) (B) in different vegetation types (STR: *Stratiotes aloides*, TRA: *Trapa natans*, NYM *Nymphaea alba*, CER: *Ceratophyllum demersum*, MAR: marshy vegetation).

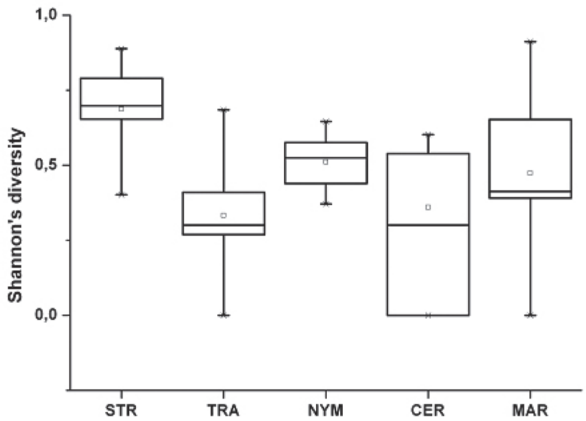

Fig. 2. Results of Shannon's diversity index (F=1,213; df=4; p=0,340) (STR: *Stratiotes aloides*, TRA: *Trapa natans*, NYM: *Nymphaea alba*, CER: *Ceratophyllum demersum*, MAR: marshy vegetation)

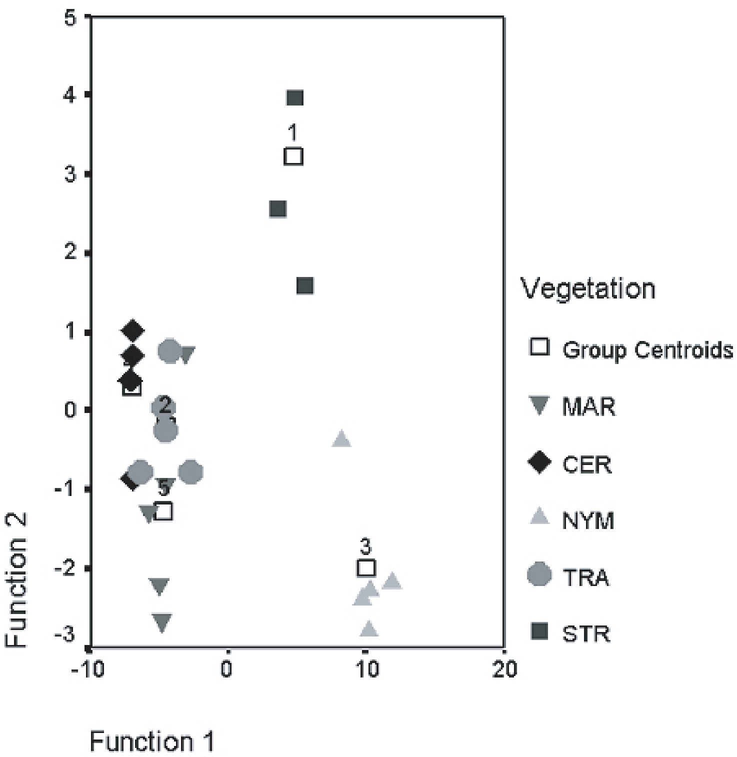

Fig. 3. Results of discriminant analysis (STR: *Stratiotes aloides*, TRA: *Trapa natans*, NYM: *Nymphaea alba*, CER: *Ceratophyllum demersum*, MAR: marshy vegetation).

DISCUSSION

Different vegetation types of Nagy-morotva, a backwater of Tisza, were compared on the basis of their chironomid assemblages. The most unique midge communities were found in *Stratiotes aloides* dominated vegetation. Besides a high diversity was typical for marshy vegetation. The mining chironomid larvae (*Endochironomus tendens*, *Glyptotendipes cauliginellus*, *Glyptotendipes pallens*) occured predominantly in these vegetation types. Both of them have thick leaves and a lot of partially or totally dead plant tissues, which ensure food and living space to the larvae. LINHART et al. (1999) also found the importance of *Stratiotes aloides* as mesohabitat in aquatic ecosystems.

Chironomid assemblages of the other vegetation types partially overlapped, but were distinct as well. Certain species occured in *Nymphaea alba* dominated vegetation type which probably came from mixed sediment (for example *Chironomus* spp.).

The vegetation of an other backwater of Upper-Tisza was studied with the same method (TÓTH et al. 2006). In this case the five vegetation types differed significantly from each other. Besides the *Stratiotes aloides* dominated vegetation type and the marshy vegetation the *Ceratophyllum demersum* dominated vegetation type had the most unique chironomid communities, which can be explained with the structure of these vegetations.

Macrophytes comprise a very important living space in the water. Our results suggest that the structure of plants is associated with the composition of their chironomid communities. The vegetations with complex structure have the highest number of individuals and the highest number of species, because these ensure adequate living space to chironomids. Vegetations which have thick leaves and old, more or less died plant tissues are important to mining chironomid larvae. *Trapa natans* and *Nymphaea alba* have floating leaves, these ensure the least hiding place resulted in the lowest number of individuals and the lowest species richness in these vegetation types.

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