

## DATA TO THE MACROZOOBENTHOS OF BACKWATER “GYÁLAI HOLT-TISZA”

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*Szító, A. and Györffy, Gy. (2006): Data to the macrozoobenthos of backwater “Gyálai Holt-Tisza” – Tiscia 35, 85-87*

**Abstract.** The total area of the investigated backwater was 160 hectares. Individual density and species composition were investigated in 24 sampling places. Deep sediment was characteristic for all backwater areas. The species richness was as follows: Oligochaeta 2, Isopoda 1, Trichoptera 1, Chironomids 10, fly larva 1 (Syrphidae), and ceratopogonids. *Limnodrilus hoffmeisteri* was dominant and the most abundant, its individual density changed between 0 and 3475/m<sup>2</sup>, which indicated the hard degradation of the backwater. We suspected temporary oxygen depletion in such areas, where Oligochaeta were absent during the propagation period. The bivoltine Diptera and Trichoptera species only populated the different areas of backwater temporarily, their individual density depended on the oxygen quantity of the sediment/water line. The area of the backwater is highly degraded. The species number increased from the northern to the southern part because of the different utilisation of the area in the past and present.

*Keywords:* backwater, macrozoobenthos, evaluation of ecological stage

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### Introduction

The backwater Gyálai Holt-Tisza is one of the cut-offs of the River Tisza between 159.6 and 167.6 river kms. This biotope is the biggest in the Tisza River valley with its length of 18.7 km and total water surface of 160 hectares (Pálfai, 2003). The biotope has been divided into three pools by dams and sluices from 1906, and the utilization of the pools is different (Fig. 1).

The lower pool from the pumping station of Lúdvár to the sluice of “Szérűskerti átjáró” is a fishing area while storing excess surface waters and providing water for irrigation; the middle pool from the sluice of the “Szérűskerti átjáró” to the sluice of “Fehérparti átjáró” is an angler water while storing excess surface waters which is also used for irrigation. The upper pool from the sluice of “Fehérparti átjáró” to “Hattyasi szivattyútelep” existed as storage of sewage and excess surface waters earlier; nevertheless, the water pollution decreased nowadays, but did not come to an end (Pálfai, 1991, 2003). The macrozoobenthos was

unknown in this backwater; therefore, we started to collect some basic data in the spring of 2000.

### Material and methods

Samples were collected in April of 2000 with an Ekman-Birge dredge on each sampling site of the examined areas from a surface of 20×20 cm a time. The total sampled surface was 400 cm<sup>2</sup> of each site.

Samples were washed through a net with a mesh size of 250 µm immediately after collecting and the retained material was preserved in 3-4% formal solution. The main investigation part of the backwater took place from the “Röszei átjáró” to the end of the country border (between Serbia and Hungary). We collected 14 samples here, 3 samples at “Szérűskerti átjáró”, 6 samples between “Fehérparti átjáró” and “Szérűskerti átjáró”, and one sample in the “Feketevíz” area (Fig. 1, Table 1). The middle pool between “Szérűskerti átjáró” and “Fehérparti átjáró” is an area that is strongly separated by hydraulic structures. Similar to this was the other part of backwater called “Feketevíz” near the city of Szeged. The lower pool between the

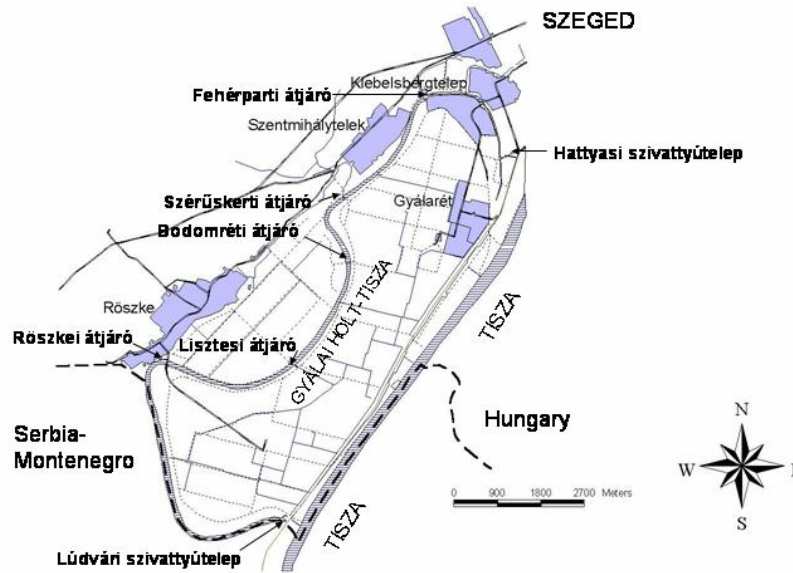


Fig. 1. Backwater “Gyálai Holt-Tisza” with sampling places

country border and “Szerűskerti ájtáró” often gets water supply from the River Tisza, while the middle pool gets the supply from the drainage waters (Fig. 1). Hungarian and foreign author’s works were used for the species determination (Ashe *et al.* 1990, Bíró 1981, Ferencz 1979, Fittkau 1962, Fittkau *et al.* 1983, Hirvenoja 1973, Pinder *et al.* 1983).

Samples were evaluated according to the different sections of the backwater.

## Results

Sixteen species were present in the samples while the individual density fluctuated between 0 and 3475 per square meter. *Limnodrilus hoffmeisteri* was the most abundant; however, that same species was absent in 6 sampling places. The great variation between samples demonstrated by the standard deviations, may signal the significant heterogeneity of the biotope (Table 1).

The species number changed between 1 and 6; one species was present in 7 sampling places: *Limnodrilus hoffmeisteri* was collected 4 times, both *Tubifex tubifex* and Ceratopogonids one time, while *Limnephilus flavicornis* was found 2 times. Tolerant species to the low oxygen concentrations formed the macrozoobenthos. Ten species of the Chironomids were detected, their individual density changed between 0 and 2650 per square meter. The species number was the highest in the least polluted

southern section and progressively decreased toward the northern part. *Limnodrilus hoffmeisteri* was the only species found in “Feketevíz”, it was present near “Fehérparti ájtáró”; the cause of its presence may be the opening of the sluices after heavy precipitation. Long term settlement and reproduction of species was impossible here because of the continuous oxygen depletion. Regarding the species composition the upper pool was the most separated; its ecological circumstances were suitable to develop a deficient food web only (Györffy 2005).

## Conclusions

Sixteen species of macrozoobenthos were detected in the backwater “Gyálai Holt-Tisza”, but the species richness varied from 1 to 6 in sampling places. Moreover, the common, everywhere abundant species were often present in low individual density only. The macrozoobenthos showed an extremely strong degradation. The species tolerance to the low oxygen concentrations was different, but all species were characteristic to eutrophic-hypertrophic ecosystems. *Limnodrilus hoffmeisteri* was the most tolerant to the low oxygen concentrations and temporary oxygen depletions, but its absence was detected in some sampling sites because of the long term or continuous oxygen depletion.

Table1. The species composition and individual density in different parts of the backwater “Gyálai Holt-Tisza”

Taxa	Röszei átjáró- Lúdvári pump st.		Szerűskerti átjáró- Röszei átjáró		Fehérparti átjáró- Szerűskerti átjáró		Feketevíz (n=1)
	Average (n=14)	st. dev.	Average (n=3)	st. dev.	Average (n=6)	st. dev.	
<i>Limnodrilus hoffmeisteri</i>	555,36	1222,3	91,67	62,92	65,5	68,71	25
<i>Tubifex tubifex</i>	51,79	129,15	16,67	28,87	0	0	0
<i>Asellus aquaticus</i>	0	0	8,33	14,43	0	0	0
<i>Procladius choreus</i>	1,79	6,68	0	0	0	0	0
<i>Tanytus punctipennis</i>	16,07	31,94	0	0	0	0	0
<i>Chironomus riparius</i>	0	0	0	0	8,33	12,91	0
<i>Cryptochironomus redekei</i>	5,36	10,65	0	0	8,33	12,91	0
<i>Dicrotendipes nervosus</i>	5,36	14,47	41,67	72,17	0	0	0
<i>Glyptotendipes gripekoveni</i>	3,57	13,36	0	0	0	0	0
<i>Parachironomus arcuatus</i>	17,86	22,85	0	0	12,5	20,92	0
<i>Parachironomus tenuicaudatus</i>	0	0	883,33	1530	0	0	0
<i>Cladotanytarsus mancus</i>	0	0	41,67	72,17	0	0	0
<i>Tanytarsus curticornis</i>	1,79	6,68	0	0	0	0	0
<i>Ceratopogonida larvae</i>	16,29	41,06	0	0	8,33	20,41	0
<i>Diptera larvae</i>	1,79	6,68	8,33	14,43	0	0	0
<i>Limnephilus flavicornis</i>	7,14	20,64	0	0	0	0	0
Density (ind/m <sup>2</sup> )	684,14	1382,2	1091,67	1587,9	103	49,44	25
Species number	12		7		5		1

The big changes of the individual density between 0 and 3475 per square meter showed the degraded and heterogenic stage of the investigated biotope. Most of the species that formed the macrozoobenthos were dipteran larvae, which were able to settle the areas temporarily, when the oxygen depletion came to an end, but they left or died due to the continuous oxygen depletion. The species richness was the biggest (12) in the border part where the anthropogenic disturbance was the lowest, and it fluctuated between 7 and 5 when the anthropogenic effects became stronger (e.g. closeness of a settlement or a resort area, usage for angling), while the species richness was only one in the “Feketevíz”, whose ecosystem was heavily polluted in the past, presently gets term-, salt- and organic pollution effects.

These results are substantial for previous information collection only. To get a more thorough picture, we will need to investigate further based on samples taken at different times.

## References

- Ashe, P. and Cranston, P. S. (1990): Chironomidae. In: Soós (ed.) Catalogue of Palaearctic Diptera. – Akadémiai Kiadó, Budapest, 113-449.
- Biró, K. (1981): Az árvaszúnyoglárva (Chironomidae) kishatározója (A guide for identification of Chironomidae). In: Felföldy (ed.) VHB 11,1-230, VÍZDOK, Bp..
- Ferencz, M. (1979): A vízi kevéssertéjű gyűrűsférgék (Oligochaeta) kishatározója (A guide for the identification of aquatic Oligochaeta). - In: Felföldy (ed.) VHB 7, 1-170, VÍZDOK, Bp..
- Fittkau, E. J. (1962): Die Tanypodinae (Diptera, Chironomidae). – Abhandlungen zur Larvensystematik der Insekten, 6, 1-453.
- Fittkau, E. J. and Roback, S. S. (1983): 5. The larvae of Tanypodinae (Diptera: Chironomidae) of the Holarctic region - Keys and diagnoses. – Ent. Scand. Suppl., 19, 33- 110.
- Györfly, Gy. (2005): A Gyálai Holt-Tisza ökológiai vizsgálatának eredményei (Results of ecological investigations of backwater Gyálai Holt-Tisza). — In: Pálfi, I. (ed.): A II. Szegedi Holtág-konferencia előadásai. 2004. szeptember 21. – Környezetvédelmi és Vízügyi Minisztérium, Budapest, 87-108.
- Hirvenoja, M. (1973): Revision der Gattung Cricotopus van der Wulp und ihrer verwandten (Diptera: Chironomidae). – Ann. Zool. Fenn., 10, 1-163.
- Pálfi, I. (1991): Holtágak és síkvidéki tározók komplex értékelése II. A Gyálai Holt-Tisza esettanulmánya. (Complex evaluation of backwater and plain reservoirs II. The case study of Gyálai Holt-Tisza) - Alsó-Tisza vidéki Vízügyi Igazgatóság, Szeged, pp.1-37.
- Pálfi, I. (2003): Oxbow-lakes in Hungary. – Ministry of Environmental Control and Water Management, Budapest, pp. 1-127.
- Pinder, L. C. V. and Reiss, F. (1983): 10. The larvae of Chironominae (Diptera: Chironomidae) of the Holarctic Region. - Keys and diagnoses. – Ent. Scand. Suppl. 19, 293-435.