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The Hirudinea fauna of the Szigetköz (1850 — 1796 river km)

By

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Abstract. The Hirudinea fauna of the Szigetköz region along the Danube (1850 — 1796 river km) was studied in 1988—1992. Leeches were collected from different substrates and water bodies in the area. The extremely diverse littoral zone in the Szigetköz region provided an excellent habitat for Hirudinea species. Even characteristic main arm species withdrew to slower moving side arms and appeared again in the main arm only downstream to the area. Six new species for the area were recorded (*Glossiphonia paludosa, G. verrucata, G. concolor, Hirudo medicinalis, Erpobdella testacea, Trochaeta bykowskii*). The relative abundance of the species had also changed as to compare to SOÓS's 1967 results. New catch drains predicted to become permanent water bodies were colonised slowly in spite of their regular connection with neighbouring side arm systems during floods.

In running waters the littoral zone is the habitat with the most characteristic animal and plant communities to describe any given section. It is a typical biotope of Hirudinea species, which are able to adapt to different microhabitats. Even Professor DUDICH himself wrote about leeches in his 1948 paper "A Duna állatvilága" (The fauna of the Danube). He listed eight species as typical main arm, side arm or ectoparasite species in the river. The presence, absence and abundance of leeches characterise well the changes of their environment especially as some species can live up to three or four years (MANN, 1953, ELLIOTT, & TULETT, 1986). They can also have a remarkable biomass even in the main arm of the Danube in the Szigetköz region (ERTLOVÁ, 1968). Most typically it occurs in late spring — early summer with *Erpobdella octoculata*, when the water discharge is high (BOURNAUD, TACHET, ROUX & AUDA, 1987).

The investigations having currently been carried out at the Hungarian Danube Research Station of the Hungarian Academy of Sciences had a four-fold aim. They produced a data base and gave information on the original status of the area as they were begun parallel to the construction of the Bős/Gabčikovo — Nagymaros River Barrage System, before alterations were made in the Szigetköz area. This situation also provided an opportunity for the follow up of the changes in the original water bodies and the new catch drains. Besides the above outlined goals, there was an obvious chance to collect information on leech biology. The work of SOÓS (1967)

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gave basis for the evaluation of long-term changes in the Hirudinea fauna of the Szigetköz region.

Site and method

The Szigetköz region is situated south from the Danube containing 77 side arms with a total length of 137 km-s between the 1850 and the 1796 river km of the main arm (VÁRDAY, 1987). It is the beginning of the middle section of the river with a considerable change in the slope from 43 cm to 7 cm in a kilometre resulting in an inner delta system on both sides of the main arm unique for Central Europe. That is the area affected the most by the Bős/Gabčikovo River Barrage.

Sampling was carried out in the whole area of the Szigetköz region from the Mosoni Danube Reach to the main arm. Different water types were investigated. Sampling localities are shown in Figure 1. They were grouped according to their position in the region (Mosoni Danube Reach, main arm — side arm systems). Within these categories samples were taken from different water types. New catch drains, having been predicted to be constant water bodies even after the compilation of the construction were also monitored.

Fig. 1. Map of the area with the sampling localities

Manual sampling was carried out (SLÁDEČEK & KOSEL, 1984) from different substrates (stones and rocks, wood, aquatic vegetation). Leeches were anaesthetised by adding alcohol into the sample over a period of 15 — 30 minutes. In the immobilised state they were preserved with 4% formaldehyde or 70% alcohol. The animals were determined according to SLÁDEČEK & KOSEL (1984) and SAWYER (1986).

Results

Zoogeographical data

Six new species for the area (*Glossiphonia paludosa, G. verrucata, G. concolor, Hirudo medicinalis, Erpobdella testacea, Trochaeta bykowskii*) were recorded in our survey (Table 1). It is partly because of changes in the distribution areas due to

Table 1. The leech fauna of the Szigetköz region

	1967 (SOÓS)	1988-1992
Glossiphoniidae		
Helobdella stagnalis L.	+	+
Glossiphonia paludosa C.		+
Glossiphonia verrucata M.		+
Glossiphonia complanata L.	+	+
Glossiphonia concolor A.		+
Alboglossiphonia heteroclita L.	+	+
Theromyzon tessulatum M.	+	+
Hemiclepis marginata M.	+	+
Piscicolidae		
Piscicola geometra L.	+	
Hirudinidae		
Haemopis sanguisuga L.	+	+
Hirudo medicinalis L.		+
Erpobdelliidae		
Erpobdella nigricollis B.	+	+
Erpobdella octoculata L.	+	+
Erpobdella testacea S.		+
Dina lineata M.	+	+
Trochaeta bykowskii G.		+

natural or man-made reasons, partly because of the different methods used in the two investigations. In most cases there were no reasonable evidences whether they immigrated or were already present before 1967. *Trochaeta bykowskii* is a species, which was definitely proved to enlarge its distribution area and seems to move upstream with a considerable speed. It had not been recorded from the Hungarian Danube stretch before 1987 but by 1991 it was even found in the upper region (1816 river km). Most probably it will colonize the Danube in Lower Austria soon though in a recent survey (NESEMANN, 1989), it was not recorded from that section. *Piscicola geometra* could not be collected, though its presence in the region was highly probable as the Szigetköz was the most important spawning area for fish along the Hungarian Danube stretch upstream Budapest and this species is known to infest spawning fish the most heavily (CONELLY & MCCARTHY, 1984). *Erpobdella octoculata, Dina lineata* and *Glossiphonia complanata* remained the predominant species but the relative abundance of the concomitant species changed partly due to the different sampling methods.

The area with the greatest number of species was the main arm and the side arm systems (Figure 2) with the most diverse habitats in the region. Fewer species were found in the Mosoni Danube Reach (Figure 3), the appearance of new Glossiphonidae species and the fast spreading *Trochaeta bykowskii* can be predicted to colonize that stretch soon. The number of species found in the catch drains was well below any of the other areas (Figure 4) till 1991 (PUKY, 1994).

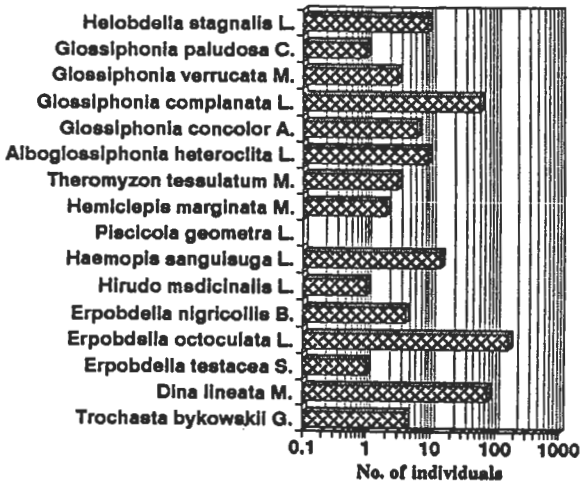

Fig. 2. The occurrence of Hirudinea species in the main arm and the side arm systems in 1988—1991

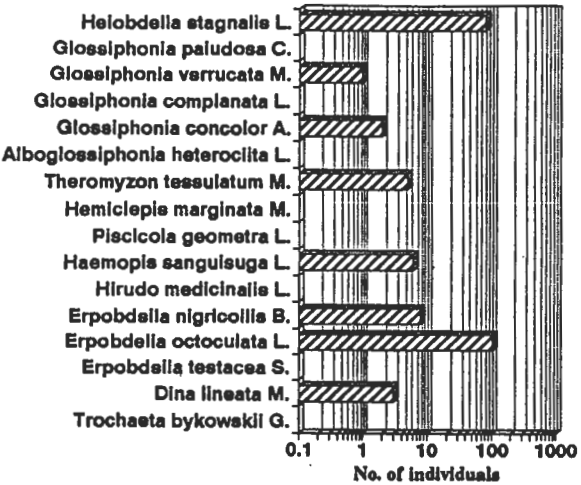

Fig 3. The occurrence of Hirudinea species in the Mosoni Danube Reach in 1988—1991

Temporal changes

Two phenomena were recognised after a comparison of our data set with Soós's data (1967). The number of species seemed to decrease along the Moson reach, first of all limnophil species disappeared. Besides, till 1991 the catch drains were inhabited only by the same species as the main arm twenty five years before. Certain changes in the relative abundance were considerable (Figure 5 and Figure 6). The predominant species in the whole water system was *Erpobdella octoculata,* with a 45—46% dominance along the Moson branch as well as in the main arm and the side arm systems. It is in agreement with ELLIOTT's results (1973), who described *Erpobdella octoculata* as the usual predominant leech in European run-

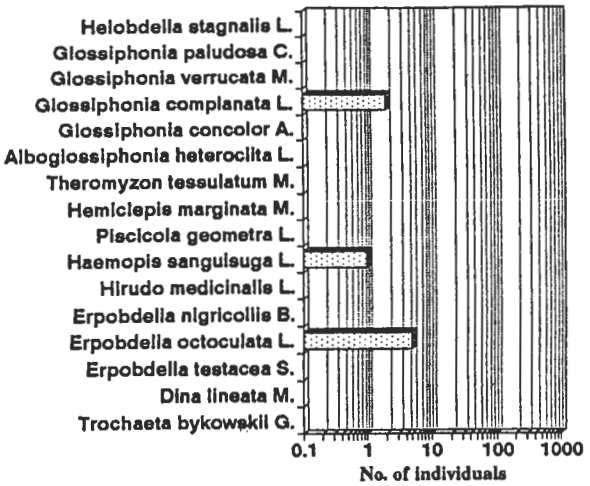

Fig 4. The occurrence of Hirudinea species in the catch drains in 1988—1991

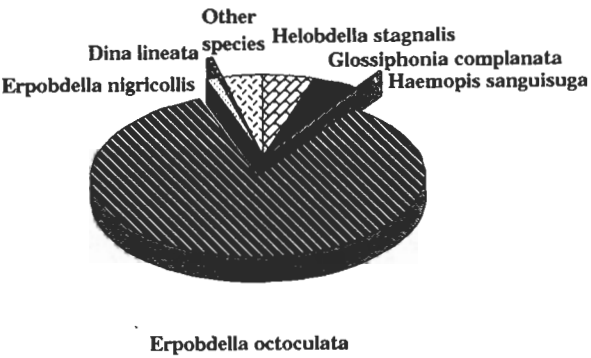

Fig 5. The relative abundance of Hirudinea species in the Szigetköz in 1967

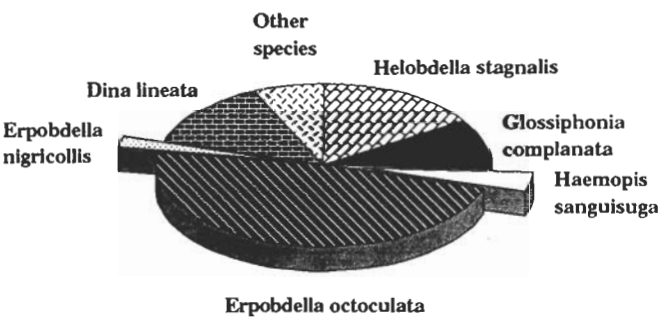

Fig 6. The relative abundance of Hirudinea species in the Szigetköz in 1988—1991

ning waters and that of RUSSEV & MARINOV's early findings (1964) on the Bulgarian Danube section, where *Erpobdella octoculata* was the only species which were found along the complete stretch.

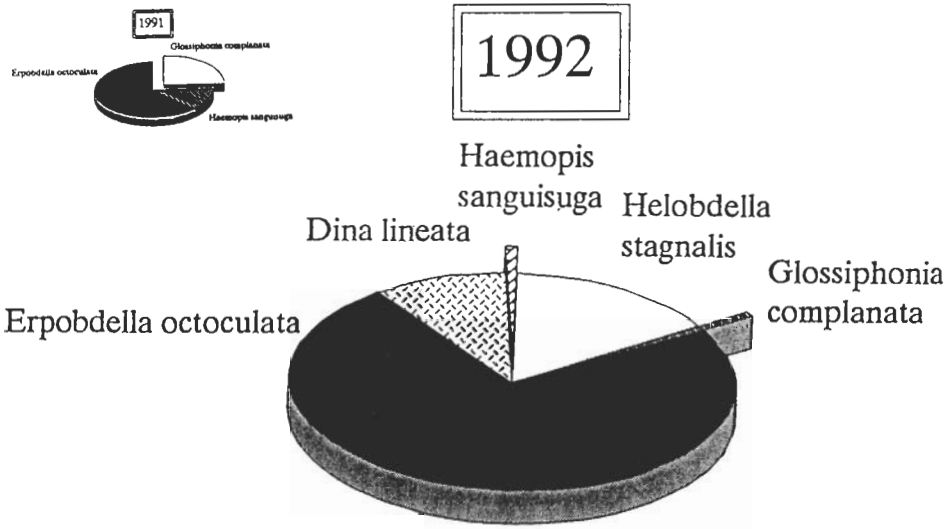

Fig 7. The occurrence of Hirudinea species in the catch drains in 1991 and in 1992 (size proportional to the individual numbers)

The colonization of the catch drains

While there was a great variety in the Hirudinea fauna of the side arm systems, only three species could be recorded in the catch drains until the end of 1991. In 1992 two more species were found in them. In 1992 both the species and the individual number increased, which can only partly been explained by a better sampling strategy. Leeches were mainly present around disturbed parts of the system, e. g. the washed away dike at Doborgazsziget. The individual number remained very low. It can directly be connected to the structure of the drains, which are straight channels with no aquatic vegetation edged with poplars *(Populus cinerea canadensis).* In spite of the regular connection with the neighbouring side arms and oxbow lakes during floods species diversity remained low in the catch drains due to its uniform structure.

Discussion

The extremely diverse littoral zone in the Szigetköz region provided an excellent habitat for Hirudinea species. Lotic and lentic as well as characteristic lowland species occurred there (SLÁDEČEK & KOSEL, 1984). It had a greater number of species than either the neighbouring upstream section (NESEMANN, 1989) or the Bulgarian section further downstream (RUSSEV & MARINOV, 1964; RUSSEV & JANEVA, 1976 found seven species in the Bulgarian Danube). Even species characteristic for the main arm withdrew to slower moving side arms and appeared again in the main arm only downstream between Nagybajcs and Gönyü (1802 — 1791 river km) along the Hungarian section of the main arm. CSÁNYI (1994) recorded a similar trend during a seven year sampling period studying the macrozoobenthon community along a nearly

200 km main arm stretch of the Danube. An important element from the list of new species is *Hirudo medicinalis*, which was already listed in the IUCN Invertebrate Red Data Book as early as 1983 (WELLS et al, 1983). Its status was and still is mostly unknown, especially in Central and Eastern Europe (WELLS et al, 1984; ELLIOTT & TULETT, 1984). The lack of *Piscicola geometra* might be in connection with its high oxygen consumption as several of its host species lived in the area (ELLIOTT & MANN, 1979).

SOÓS (1967) found *Erpobdella octoculata* to be the predominant species. It can stay in the littoral zone for several seasons and reach high densities up to 3,300 individuals/m^2 (ŠAPKAREV, 1970). As an effective predator of chironomid larvae, oligochaetes and other prey and due to its successful survival strategy (hiding under stones during the day to avoid fish predation) it can have an important ecological role. SCHÖNBORN (1985) calculated an annual prey consumption of 1,000 — 1,500 g wet weight/m^2 for the River Saale. It also turned out to be a final consumer in the main food chain. In our study three more species, *Helobdella stagnalis, Dina lineata* and *Glossiphonia complanata* also exceeded the 10% relative abundance limit.

The fauna of disturbed areas because of dam construction naturally changes, species disappear for shorter periods. Still, the slow colonization of the catch drains was remarkable especially as they had a regular connection with the side arm system around them during floods. As current velocity and some other physico-chemical factors (e. g. water temperature) would have been favourable for a faster faunal development, other habitat-related causes, the lack of suitable hiding places, inadequate food supply etc. must be responsible for this process.

REFERENCES

1. BOURNAUD M., TACHET, H., ROUX, A. L. & AUDA, Y. (1987): The effects of seasonal and hydrological influences on the macroinvertebrates of the Rhône River, France. 1. Methodological aspects. — Archiv für Hydrobiologie, 109(2): 287—304.

2. CONELLY, I. J. & MCCARTHY, T. K. (1984): The metazoan parasites of freshwater fishes in the Corrib catchment area, Ireland. — Journal of Fish Biology, 24: 363—375.

3. CSÁNYI, B. (1994): The macrozoobenthon community of the Upper Hungarian Danube. — 30. Arbeitstagung der IAD, Zuoz, Schweiz. Wissenschaftliche Kurzreferate: 74—78.

4. DUDICH, E. (1948): A Duna élővilága. — Természettudomány, III/6: 166—180.

5. ELLIOTT, J. M. (1973): The life cycle and production of the leech, Erpobdella octoculata (L.) (Hirudinea: Erpobdellidae) in a Lake District stream. — Journal of Animal Ecology, 42: 435—448.

6. ELLIOTT, J. M. & MANN, K. H. (1979): A key to the British freshwater Leeches. — Freshwater Biological Association, Scientific Publications, 40: 1—72.

7. ELLIOTT, J. M. & TULETT, P. A. (1984): The status of the medicinal leech, Hirudo medicinalis in Europe and especially in the British Isles. — Biological Conservation, 29: 15—26.

8. ELLIOTT, J. M. & TULETT, P. A. (1986): The effect of temperature, atmospheric pressure and season on the swimming activity of the medicinal leech, Hirudo medicinalis (Hirudinea: Hirudinidae), in a Lake District tarn. — Freshwater Biology, 16: 405—415.

9. ERTLOVÁ, E. (1968): Die Mengen des Zoobenthos in den Schottern des Donaumedials. — Arch. Hydrobiol. Suppl. 34. (Donauforschung III) 4: 321—330.

10. MANN, K. H. (1953): The history of Erpobdella octoculata (L.) (Hirudinea; Erpobdellidae) in a Lake District stream. — Journal of Animal Ecology, 42: 435—448.

11. NESEMANN, H. (1989): Die Egelfauna (Hirudinea) der niederösterreichischen Donau zwischen Stockerau und Wolfsthal. — Lauterbornia H, 2: 35—51.

12. PUKY, M. (1994): Long-term changes in the distribution of leeches along the Danube in Hungary. — Verh. Internat. Verein. Limnol., 25: 1695—1696.

13. RUSSEV, B. & JANEVA, I. (1976): Review of the species composition, distribution ecology and index significance of leeches (Hirudinea) in Bulgaria. — Hydrobiology, 40—56. (In Russian).

14. RUSSEV, B. & MARINOV, T. (1964): Über die Polychaeten- und Hirudineenfauna im Bulgarischen Sector der Donau. — Bulletin de L'Institut et Musée de Zoologie, 15: 191—197. (In Russian).

15. ŠAPKAREV, A. (1970): Seasonal changes in a population of Erpobdella octoculata L. (Hirudinea) in the large lakes of Macedonia (Dojran, Prespa and Ohrid). — Annuaire de la Faculté des Sciences de l' Université de Skopje, 22: 19—31. (In Russian).

16. SAWYER, R. T. (1986): Leech biology and behaviour. Vol. 2.: Feeding biology, ecology and systematics. — Clarendon Press Oxford: 711—720.

17. SCHÖNBORN, W. (1985): Die ökologische Rolle von Erpobdella octoculata (L.) (Hirudinea: Erpobdellidae) in einem abwasserbelasteten Fluß (Saale). — Zool. Jb. Syst., 112: 477—494.

18. SLÁDEČEK, V. & KOSEL, L. (1984): Indicator value of freshwater leeches (Hirudinea) with a key to the determination of European species. — Acta Hydrochim. et Hydrobiol., 12(5): 451—461.

19. SOÓS, A. (1967): On the leech fauna of the Hungarian reach of the Danube. — Opusc. Zool. 7: 241—257.

20. VÁRDAY, N. (1987): A kisalföldi Duna-szakasz hidrológiai, hidrográfiai és vízkémiai viszonyai. — In "A kisalföldi Duna-szakasz ökológiája." pp 7—41.

21. WELLS, S. M., ELLIOTT, J. M. & TULLETT, P. A. (1984): Status of the medicinal leech, Hirudo medicinalis. — Biological Conservation, 30: 379—380.

22. WELLS, S. M., PYLE, R. M. & COLLINS, N. M. (1983): The IUCN invertebrate red data book. — Gland, IUCN.