

Contribution to the Knowledge on the Invertebrate Macrofauna Living in the Pondweed Fields of Lake Fertő

By

S. ANDRIKOVICS*

Abstract. Founded on two years of collection at monthly frequency, the author demonstrated 73 taxa of the macrofauna from the pondweed habitats of Lake Fertő. Relying upon the character of the macrofauna, he compares the fauna associations of the open water with those of the isolated pondweed fields. Within the possibilities afforded by the adopted collecting method, he also makes some mass-dynamical and synbiological observations. The lack of natronophilous forms, as well as the great number of species of wide tolerance in the animal groups support the astatic character of Lake Fertő in zoological respect.

In hydro-ecological respect the pondweed fields of Lake Fertő take an intermediate place between reeds and open water. The invertebrate macrofauna connecting to them is advantageously influenced by the generally favourable water climate and by the abundance of the base. It is unfavourable, on the other hand, that in Lake Fertő they are, as a rule but unstable formations.

According to our knowledge up to now, invertebrate macrofauna is affected in the first by the location, size, density and dominant species of the pondweed stands (1, 4). In Lake Fertő, this effect is manifested in the first place in quantitative respect (1).

By the term invertebrate macrofauna the organisms belonging to an order of magnitude of about 0.2 – 20 mm are meant, of which the majority is classified among the aquatic insects and their larvae. Besides the elaboration of these, also considering special Fertő respects, the author set himself the aim of determining the frequently occurring species of the groups of Hirudinoidea, Gastropoda and Hydracarina.

In view of the generally known taxonomic difficulties of zoological examinations covering several animal groups and performed by non-specialists, the author could only strive for surveying the frequently occurring species. He also intends

Dr. Sándor Andrikovics, ELTE Állattrendszertani és Ökológiai Tanszék (Zoosystematical and Ecological Institute of the Eötvös Loránd University), 1088 Budapest VIII. Puskin u. 3.

to develop the examinations by further detailed studies (raising larvae, imago examinations) of the animal groups of major importance.

The place, date and method of sampling

The constant sampling areas were the pondweed fields of the Rákos flat in front of the reed screen, the lakes Herlakni, Hidegség and Überfart. The author often collected, besides, in the area of the Madárvárta-, Hegykő- and Rucás-inlets. The examinations were conducted in 1971–72, during the vegetation period, as a rule from May to October with monthly frequency. In 1971, the dates of collection were: May 27th, June 29th, July 28th, August 23rd, September 14th and October 27th. In 1972, the zoological collections were done on May 5th, June 2nd, July 11th, August 23rd, September 19th and October 26th. In the examinations the author adopted the so-called approximating quantitative collecting method. The results he indicated with the frequency numbers 1, 2, 3 and 4. The figures, meaning 1 = few, 2 = medium, 3 = many, 4 = in large numbers, stand for the relative quantities varying with the animal groups.

The results of the examinations and their evaluation

Founded on the elaboration of the material of the two years' systematic zoological collection, the author could demonstrate 7 Hirudinoidea, 9 Gastropoda, 1 Isopoda, 4 Ephemeroptera, 10 Odonata, 12 Trichoptera, 2 Lepidoptera, 4 Coleoptera, 8 Heteroptera and 15 Hydracarina taxa. A detailed enumeration of the species is presented in Tables 1, 2, 3 and 4. To the demonstrated 73 taxa even at this order of magnitude the vast quantity of Diptera larvae is added, the detailed elaboration of which the author could not even undertake.

In the groups examined by the author, the organisms which turned up were all species of wide ecological valency. Up to the present he did not find natronophilic forms.

In agreement with the zoological examinations conducted in the pondweed fields of Lake Balaton or in those of the lakes of eastern Holstein (2, 4) also the fact appeared that in the surveyed animal groups the demonstration of an animal species living in merely one pondweed field could not be expected either. Therefore, the author did not separately indicate the pondweed species in the Tables.

The macrofauna of the open-water pondweed fields is relatively poor, probably on account of the rather unfavourable conditions of population and of intensive wind action. In open-water *Potamogeton pectinatus* directly not connected with the reed screen one can meet with a population characterized by the dominance of larvae of *Enallagma cyathigerum*, *Ischnura pumilio*, *Erythromma najas*, *Cloeon dipterum*, *Micronecta pusilla* and Chironomidae.

The spots of *Myriophyllum spicatum* directly connected with the reed screen already provide conditions of life for a macrofauna more avaried as to quality.

In the pondweed stands of the clearings enclosed in the reeds the macrofauna proved richer both in quality and in quantity than in the open-water pondweed

ields. In the first place varied communities of phitophagous Chironomidae, Ephemeroptera, Odonata, Trichoptera, Heteroptera, and Gastropoda have formed here.

As compared with the open-water pondweed fields, a qualitative difference appeared also in the circumstance that, instead of *Micronecta pusilla*, a Heteroptera community consisting mainly of *Naucoris cimicoides*, *Cymacia coleoptrata* and *Sigara striata* was characteristic of the pondweed fields in the clearing enclosed in the reeds. However, the quantity of the single taxa as compared with one another was different so-to-say in each of the habitats. Out of the isolated pondweed fields those consisting of *Myriophyllum verticillatum* and *Utricularia vulgaris* had the richest macrofauna. The macrofauna of the spots of *Potamogeton pectinatus*, also frequent in the reed zone proved the poorest as to quality.

The dominant organisms of the *Utricularia vulgaris* fields were, besides the Chironomidae, various Hirudinoidea species. In the pondweed stands of the clearings enclosed in the reeds, similarly to the open-water habitats, the most frequent species of mayflies was *Cloeon dipterum*. On the other hand, of the spots of *Utricularia* and *Najas*, being in closer connection with the sediment, the species of *Caenis* were characteristic.

Population dynamic and synbiological comments

The examinations conducted with monthly frequency in the vegetation period also permit to draw approximating conclusions on mass dynamism. The changes in dynamism and our observations of synbiology are going to be surveyed by animal groups.

Gastropoda

Their quantity increases in the course of the vegetation period. Relying on the numbers of frequency the mass dynamism of the single species does not present a clear picture. Frequency numbers meaning a higher number of individuals often also occur at the beginning of the vegetation period in certain species (Table 1).

Hirudinoidea

The characteristic organisms of isolated pondweed fields. Their relative quantity is particularly significant at the beginning and at the end of the vegetation period.

Isopoda

Asellus aquaticus as a characteristic detritus-inhabiting species has a significant part in the exchange of substances of the reeds. According to the data of IMHOF and BURIAN (3), the number of their individuals per square metre is bet-

Table 2. Itemized enumeration of the Ephemeroptera, Odonata and Trichoptera larvae

Taxa	Months											
	1971						1972					
	M	J	J	A	S	O	M	J	J	A	S	O
Ephemeroptera												
<i>Cloeon dipterum</i> L.	1	3	2	4	2	4	1	2	2	2	1	3
<i>Cloeon simile</i> ETN.	1			1							1	
<i>Caenis horaria</i> L.	1	1	1	1	3	4	1	2		1	3	3
<i>Caenis robusta</i> ETN.	1	1	2	1	1	1	1	1	1		2	2
Odonata												
<i>Sympycna fusca</i> LINDEN	1	1							1			
<i>Ischnura elegans</i> LINDEN					1	1						
<i>Ischnura pumilio</i> CHARP.	2				3	2	1	1		2	1	
<i>Enallagma cyathigerum</i> CHARP.	1		1	2	3	1	1	1		3	1	
<i>Coenagrion puella</i> L.			1			1	1		1			
<i>Coenagrion pulchellum</i> LINDEN			1				1	1				
<i>Erythromma najas</i> HANSEM.	1		1	2	1	1	1				1	1
Agrionidae juv.	3	1	1	4	4	4	4	2				
Aeschnidae juv.			3	2		1					2	2
<i>Crocothemis erythrea</i> BRULLÉ	1											
Trichoptera												
<i>Cyrtus (flavidus</i> McL.?)	2	2	2	1	2	2		1	1	1		1
<i>Holocentropus picicornis</i> STEPH.	1	1	1			2				1		
<i>Ecnomus tenellus</i> RAMB.				1	2	1						
<i>Agraylea multipunctata</i> CURT.				2		3						
<i>Agrypnia pagetana</i> CURT.					2	2	1	1				1
Phryganeidae juv.					1	3						
<i>Atripsodes senilis</i> BURM.							1			1		
<i>Atripsodes</i> sp. I.							1					
<i>Atripsodes</i> sp. II							1					
<i>Oecetis ochracea</i> CURT.			1									
<i>Oecetis furva</i> RAMB.			1		1	3	1		1	1		2
<i>Oecetis</i> sp.			2									

mus are frequent. According to the data of IMHOF and BURIAN, the quantity of caddis-flies in the reed zone may attain a number of individuals of 30 per square metre. In pondweed fields there live partly other species smaller in stature, and therefore, their biomass is, in all probability, smaller. It is worth remarking that during the two years' examination period Limnephilidae species did not turn up.

Coleoptera

Larvae and imagos of Coleoptera were found in remarkably small numbers of individuals and species in the pondweed fields of Lake Fertő. As they are rather mobile organisms, the small numbers of species and individuals are probably consequences of a fault in the collecting method.

Table 1. Detailed survey of the demonstrated Gastropoda, Hirudinoidea and Isopoda species

Taxa	Month											
	1971					1972						
	M	J	J	A	S	O	M	J	J	A	S	O
Gastropoda												
<i>Limnaea stagnalis</i> L.	3						2	2				
<i>Planorbis planorbis</i> L.	3						3	3				
<i>Radix auricularia</i> L.						1						
<i>Radix peregra</i> MÜLL.	2	3			1	4	2	2	1	1		4
<i>Physa fontinalis</i> L.						4	1					3
<i>Bithynia tentaculata</i> L.	2					2	2	3		1	1	2
<i>Armiger crista</i> L.						3	3	3			3	3
<i>Gyraulus laevis</i> ALD.	1					1						
<i>Galba truncatula</i> MÜLL.		1										
Hirudinoidea												
<i>Theromyzon tessulatum</i> O. F. MÜLL.	2	1	3	1		1	1	1			1	1
<i>Helobdella stagnalis</i> L.	2		1				2	2				
<i>Piscicola geometra</i> L.	2				1	1	1					
<i>Hemiclepsis marginalis</i> O. F. MÜLL.									1			
<i>Glossiphonia heteroclita</i> L.	4				3							
<i>Hirudo medicinalis</i> L.	1						1	1				
<i>Erpobdella octoculata</i> L.					1	1						
Isopoda												
<i>Asellus aquaticus</i> L.	1		1		2	3	1	1			2	2

ween 150 and 400 in the reed zone. Their quantity in pondweed fields is much smaller. They are to be found mainly in the *Utricularia vulgaris* stands situated closer to the reeds.

Ephemeroptera

The larvae of *Cloeon dipterum* and *Caenis horaria* are frequent organisms of the pondweed fields in every season of the year. Their population dynamism can be represented by a bicuspid curve. Their quantity is greatest at the beginning and end of the vegetation period.

Odonata

Permanent and characteristic inhabitants of the pondweed fields of extensive lakes. Their biomass is considerable during the whole vegetation period. The demonstrated species are enumerated in Table 2.

Trichoptera

The most frequent caddis-fly species of the Fertő pondweed fields in *Cyrtus (flavidus?)*. Besides it, also the species of the genera *Oecetis*, *Agrypnia* and *Ecno-*

Table 3. The frequent taxa of *Lepidoptera*, *Coleoptera*, *Heteroptera* and *Diptera* of the pondweed fields of Lake Fertő

Taxa	Months											
	1971					1972						
	M	J	J	A	S	O	M	J	J	A	S	O
<i>Lepidoptera</i>												
<i>Nymphula nympheata</i> L.	1	1		1	1		1	1				
<i>Paraponyx stratiotata</i> L.						3					1	2
<i>Coleoptera</i>												
<i>Noterus crassicornis</i> MÜLL.				1				1				
Haliplidae larvae			1									
Dytiscidae larvae	1	1	2	1			1	1				
Hydrophylidae larvae	1	1		1								
<i>Heteroptera</i>												
<i>Micronecta pusilla</i> HORV.	4	1	4	4			4	2	3	3	1	
<i>Plea leachi</i> MC GR. & K.	3	1	1	1	1		1	1	1	1	1	
<i>Cymatia coleoprata</i> FABR.	4	1	2	3	2	2	4	3	3	2	4	4
<i>Sigara striata</i> L.	1	1	2	3	1	4	1	1	2	3	4	4
<i>Notonecta glauca</i> L.	1											
<i>Ranatra linealis</i> L.				1								
<i>Naucoris cimicoides</i> L.	2	1	3	1	1		2	1	3			
Corixidae larvae	4	4	1				4	4	3	3	2	
<i>Diptera</i>												
Chironomidae	4	4	4	4	4	4	4	4	4	4	4	4
Chaoboridae			1					1			1	
Ceratopogonidae	1											
Culicidae		1										

Lepidoptera

The found two species are of sporadic frequency. For outlining their mass dynamism the numbers of individuals are not high enough (Table 3).

Diptera

The larvae of Chironomidae are the most frequent macro-organisms of the fauna of the pondweed fields. As a rule, the number of their individuals and in all probability also the one of their species surpass those of all other groups.

Heteroptera

In spring, the demonstrated 8 taxa show maximum frequency of occurrence mainly in May then, contrarily to the other groups, at a somewhat earlier time, in August–September. Merely 1 specimen of *Ranatra linearis* was collected by the author, only in August, 1971. The occurrence of the Heteroptera clearly indicates the ecological difference between the pondweed fields of the open water and the reed zone.

Table 4. The frequent Hydracarina of the pondweed fields

Taxa	Months											
	1971					1972						
	M	J	J	A	S	O	M	J	J	A	S	O
Hydracarina												
<i>Eylais excendes</i> MÜLL.	1				1		1	1			1	
<i>Eylais</i> sp.	2	2			3		3	2			2	1
<i>Hydracna globosa</i> GEER.	3			1	1		3	1		1	1	
<i>Georgella helvetica</i> HALL.	1							1				
<i>Hydrodroma despiciens</i> MÜLL.	2			2	2		2	1		2	2	
<i>Neumania deltoides</i> PIERS.	1											
<i>Limnesia fulgida</i> C. L. KOCH	1							1				
<i>Piona coccinea</i> KOCH.	1						1					
<i>Piona alpicola</i> NEUM.	1						1					
<i>Piona</i> sp. I	2											
<i>Piona</i> sp. II	2						2					
<i>Arrenurus bicuspidator</i> MÜLL.	2	2					1	1				
<i>Arrenurus cuspidifer</i> PIERS.	1	1				1						
<i>Arrenurus tricuspikator</i> MÜLL.	1	2		1	2		2	2	3	1	3	2
<i>Arrenurus</i> sp.	4	4	3	3	4	4	3	3	2	3	4	4

Hydracarina

The number of both their species and individuals are significant. In spring the *Piona* and *Eylais* species appear first, then, during summer and in autumn, one most often meets with the species of the genus *Arrenurus*.

By way of evaluation, one can say that the character and approximative quantitative data of the macrofauna reflect the extremely eutrophic type of the Lake. The dominance of the species with wide toleration capacity in the animal groups examined by the author can be well explained by the astatic character of Lake Fertő.

REFERENCES

- ANDRIKOVICS, S. (1973): *Hidroökológiai és zoológiai vizsgálatok a Fertő hinárosaiban. (Hydroecological and zoological examinations in the pondweed fields of Lake Fertő).* — Állatt. Közlem., 60: 39–50.
- BIRÓ, K. & GULYÁS, P. (1974): *Zoological investigations in open-water Potamogeton pectinatus stands of Lake Balaton.* — Annal. Biol. Tihany, 41: 181–203.
- IMHOF, G. & BURIAN, K. (1972): *Energy flow studies in a wetland ecosystem (Reed Belt of the Lake Neusiedler See).* — Special Publication of the Austrian Academy of Sciences for the IBP: 1–15.
- MÜLLER-LIEBENAU, I. (1956): *Die Besiedlung der Potamogeton-Zone ostholsteinerischer Seen.* — Arch. Hydrobiol.: 470–606.