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The Crustacea of the Hungarian Area of Lake Fertő

By

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Abstract. The authors studied the Crustacea in samples taken from 43 sites of collection in the Hungarian area of Lake Fertő in the years 1960–61. In the course of the examinations they demonstrated 22 Cladocera, 8 Ostracoda, 14 Copepoda and 1 Isopoda species. Comparing the results with earlier literary data, they found that a considerable exchange of species took place in the Cladocera fauna. A species of Ostracoda, *Potamocypris unicaudata* Schäfer proved to be new for the Hungarian fauna. In the summer season the open-water Crustacea association is characterized by the species *Diaphanosoma brachyurum – Bosmina longirostris – Acanthocyclops vernalis – Arctodiaptomus spinosus*. The open-water pondweed field can be characterized by the *Alona rectangula – Acanthocyclops vernalis – Diaphanosoma brachyurum – Bosmina longirostris* species.

In 1960 we started, similarly to Lake Balaton (Tóth, 1960, 1960 *a:* Ponyi, 1962, 1965; Iharos, 1964), a complex examination of the Hungarian area of Lake Fertő. While the evaluation of the botanical and chemical works reached completion and was published the year after (Tóth, Szabó, 1961; Szabó, 1962), the elaboration of the collected zoological material could not take place on account of a variety of obstacles.

In the meantime the Fertő-Region Committee of the Hungarian Academy of Sciences was formed, and its efficient activity had for result, that from 1970 on the volumes of the "Data collection in preparation for the monograph of the Fertő Region" have been appearing one after the other. On page 453 of Vol. 3 the following statement about Crustacea may be read: "... one can refer so-to-say only to Daday's works published at about the turn of the centuries" (Andrikovics & Berczik, 1975a). Among others also this inspired us to elaborate th-Crustacea of the samples after a long while. Still, our true purpose was to obtain a comparative picture about the composition as to species and in per cent of the Crustacea of Fertő and Balaton – the two most extensive lakes of Hungary. We also wanted to know whether we shall find in the reed fields of Lake Fertő the peculiar "zones" (Balogh, 1953) characteristic of the well-developed reeds of Lake Balaton.

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Characterization of the sites of collection

We have indicated the sites of collection in Fig. 1., marked with numbers 1 to 43. For each site of collection we describe the method of collecting, as well as the circumstances which could be of importance in evaluating the results. The adopted methods of collection were suited only for determining the quality and the percentual distribution of the species. The samples were taken between July 12th – 15th, August 16th – 18th, September 14th – 15th, and on December 20th, 1960, April 24th and 25th, 1961.

The results of the chemical examinations are to be found in the work of Tóth and Szabó (1961).

Collection on 12th – 15th July, 1960

No. 1. 100 m towards the open water from the verge of the reeds we filtered 10 l of scooped water through a No. 18 plankton net. Depth of water: 80 cm, Secchi's transparency: 27.0 cm, water temperature: 22.2 °C; pH = 8.6.

No. 2. A small pondweed islet (mainly *Myriophyllum spicatum* and some *Potamogeton pectinatus)* in the vicinity of the preceding (No. 1) site; we took a scooped sample from among the single weeds and filtered it in the way as described under No. 1.

No. 3. In the place indicated in Fig. 1 we towed a No. 6 plankton net from a boat through a distance of about 300 m parallelly with the verge of the reed field, ot about 150 m from it. This sample essentially combines the Crustacea species living in the so-called "open water" and "open-water pondweeds". On account of the shallowness of the Lake, the way of the collection led through larger or smaller pondweed clumps not extending over the surface of the water.

No. 4/a. Sample collected among the single *Typha* plants by towing a No. 18 net in the outer part of the reed-type Scirpeto-Phragmitetum typhosum.

No. 4/b. Collection of *Typha* coating. The method is identical with the one applied by Ponyi (1962) for examining the coating of read.

No. 5. The reed-type Scirpeto-Phragmitetum utricullariosum is the most characteristic one of Lake Fertő. Depth of water: 5 – 10 cm. Marshy, slack water. The frequent occurrence of snails belonging to the genera *Planorbis* and *Limnaea* was remarkable.

No. 6/a. Coating of *Myriophyllum spicatum*. The description of the collecting method can be found in Ponyi's (1956) paper. The site of collection is the so-called "Herrenlacken", a "lake" encircled by reed fields. Site of collection: 30 m from the fringe of the reed field.

No. 6/b. A 10 l sample, scooped from among the stalks of *Myriophyllum spicatum* was filtered through a plankton net (No. 18). Depth of water: 69 cm, Secchi's transparency: 15.0 cm, water temperature: 18.4 °C; pH = 8.7.

No. 7. The sample was taken from the middle of the Herrenlacken, about 200 m from the reed fringe, by towing a No. 18 plankton net from a boat through a distance of about 200 m. The "lake" (the Herrenlacken) was fairly weedy even in the middle. Depth of water: 80 cm, Secchi's transparency: 18.4 cm, water temperature: 18.6 °C; pH = 8.7.

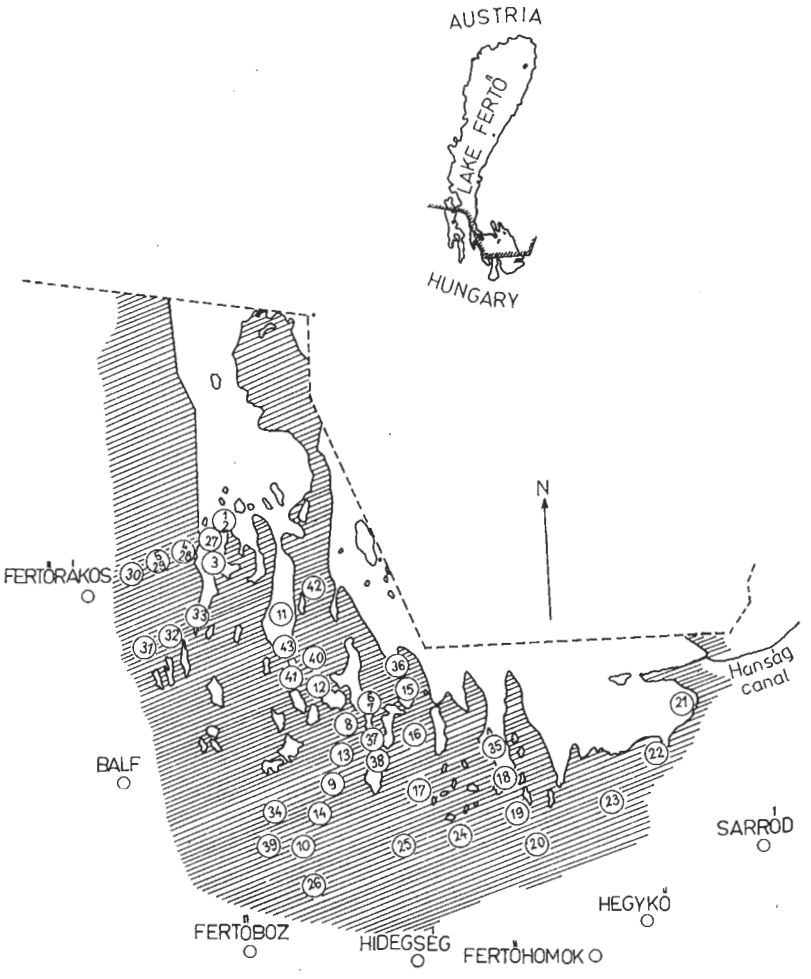

Fig. 1. Collecting sites in the Hungarian area of Lake Fertő. (Detailed explanations see in the text)

No. 8. Scirpeto-Phragmitetum utriculariosum reed-type. Besides *Utricularia vulgaris* a great quantity of detritus is to be found. Samples were collected with nets (No. 16 and 18). Water temperature: 18.4 °C; pH = 8.0.

No. 9/a. The reed-type Scirpeto-Phragmitetum utriculariosum has a peculier aspect, characterized by the mass-vegetation of *Drepanocladus aduncus* var. *kneifii*. As a rule it appears when the recession of the water begins. The samplle was taken in a way that the water in the moss was filtered through a plankton net (No. 18).

No. 9/b. *Drepanocladus* moss. It was "washed out" with care in a pail of filtered water, and the water was filtered through a No. 18 net.

No. 9/c. Collection from among *Drepanocladus* by means of a No. 6 net.

No. 10/a. Sample collected with a fine (No. 18) and a coarse (No. 6) net at the reed-free border of a plot of reeds. We observed Hydracarina as well as *Limnaea* snails in great numbers.

No. 10/b. Collection with nets (No. 6 and 18) in the reedy area of the preceding (No. 10/a) reed plot.

No. 11. Open water free of pondweed, collection with plankton net No. 18. Depth of water: 83 cm, Secchi's transparency: 17.5 cm, water temperature: 21.0 °C; pH = 8.5.

No. 12. Canal. Collection with fine and coarse nets (No. 18, No. 6), material poured together. Water temperature: 19.00 °C; pH = 8.3.

No. 13. Canal. We collected between reed and sedge with a coarse net (No. 6). Water temperature: 19.0 °C; pH = 7.9.

No. 14/a. Water sample sccoped from among *Drepanocladus* was filtered through a No. 18 net. There is no continuous water layer — larger or smaller pools can be obcerved.

Collection on 16th—18th August, 1960

No. 15. Open water free of vegetation. 20 l of scooped water filtered through a No. 18 net. Depth of water: 30 cm.

No. 16. Collected among reeds with a No. 6 net. No continuous water layer, the collected sample contains a great mass of plant fragments.

No. 17. Sample taken with a net (No. 6) among reeds.

No. 18. Open water. A 30 l scooped sample filtered through a No. 18 net.

No. 19. Canal. Sample collected with a dip-net (No. 6), in the surrounding reeds there is no water.

No. 20. Collection among reeds with a net. No continuous water layer over the ground.

No. 21. Open water, a 30 l scooped sample filtered through a No. 18 net.

No. 22. Canal. 30 l water filtered through a net No. 18. Depth of water: 70 cm. There is no water in the surrounding reed plots.

No. 23. Canal, sample collected from the shore with a dip net (No. 18). Depth of the water: 62 cm.

No. 24. Pool — the so-called "Guszti-tó" — (a pond in the Lake). Only 2—3 cm deep puddles are to be found. The water is transparent, we scooped it with care and filtered it through a (No. 18) plankton net.

No. 25. Canal. 30 l of scooped water filtered through a plankton net (No. 18). Depth of water: 80 cm.

No. 26. Slack water at the origin of one of the canals, intensely overgrown with pondweed. Collection with a No. 16 plankton net.

Collection on 14th—15th September, 1960

No. 27. Open water, a 10 l water sample scooped at about 150 m from the edge of the reeds and filtered through a No. 18 net.

No. 28. Collected from the border of a canal with a No. 6 net. Depth of the water: 90 cm.

No. 29. Pools. Opening in the weed field, produced by a tractor. Shallow, not continuous water surface. Collected with a No. 18 net.

No. 30. Dense reeds, narrow track overgrown with *Chara*. Sample was taken with a No. 16 net.

No. 31. Narrow, free water surface in reeds. Sampling with a net (No. 18).

No. 32. Dense reed field. Long-shaped depression produced by tractor, with 4 – 5 cm water. Collected with net No. 18.

No. 33. Open water. A 50 l water sample filtered through a No. 18 plankton net.

Collection on 20th December, 1961

No. 34/a. Reed plot. 25 l water sample, scooped from reed-free area, filtered through net No. 18.

No. 34/b. Reed plot. Collection from among the single reeds with nets (No. 16 and 18).

Collection on 24th – 25th April, 1960

No. 35. Open water. Samples scooped and taken with net (No. 18) combined.

No. 36. Open water; 25 l scooped water filtered through a No. 18 plankton net.

No. 37. Open water; 25 l scooped water sample taken from the "Herrenlacken" at about 30 m from the edge of the reeds and filtered through a No. 18 planktoton net.

No. 38. Open water; 25 l water sample from the middle of the "Herrenlacken" filtered through a No. 18 plankton net.

No. 39. Sample taken from plant-free "open-water" in corner of a reed plot, with plankton nets No. 18 and 6.

No. 40. Canal; 25 l water sample filtered through a No. 18 net.

No. 41. Sample taken with plankton nets (No. 6 and 18) from reed fields near canal No. 40.

No. 42. Sample taken with nets (plankton nets No. 6 and 18) from well-developed reeds.

No. 43. Open water; a 25 l water sample filtered through net No. 18.

Enumeration of the found species and their comparison with the earlier data

In the course of our examinations we found 22 Cladocera, 8 Ostracoda, 14 Copepoda and 1 Isopoda species. Also taking into consideration the data in the literature (cf. Tables 1 – 3), the number of the species recorded in Lake Fertő is much higher: Cladocera 43, Ostracoda 16, Copepoda 22. In the present study the authors do not deal with the Malacostraca species in grater detail.

As it appears from the comparison of the available literary data (Table 1) the Cladocera faunule of Lake Fertő has greatly changed. DADAY (1890, 1891, 1897, 1900) mentioned 25 species from the Lake, out of which 13 species *(Sida crystallina, Ceriodaphnia rotunda, Moina brachiata, Eurycercus lamellatus, Acro-*

Table 1. Cladocera species observed in Lake Fert up to the present

Species	t. s.	Daday	Pesta	Zakovsek	Ponyi and Dévai
		1890–1892	1950–1952	1950–1952	1960–1961
	i. d. p.	1890 1891 1897 1900	1954	1961	1976
1. *Sida crystallina* (O. F. Müller)		+	–	–	–
2. *Diaphanosoma brachyurum* (Liév)		+	+	+	+
3. *Daphnia (Ctenodaphnia) magna* Straus		–	+	–	–
4. *Daphnia (Daphnia) pulex* Leydig		–	+	+	–
5. *Daphnia (D.) curvirostris* Eylm. emend. Johnson		–	–	–	+
6. *Daphnia (Daphnia) longispina* O. F. Müller		+	+	+	–
7. *Daphnia (Daphnia) hyalina* Leydig		–	–	–	+
8. *Ceriodaphnia reticulata* (Jurine)		–	+	+	+
9. *Ceriodaphnia quadrangula* (O. F. Müller)		+	+	+	+
10. *Ceriodaphnia laticaudata* P. E. Müller		–	+	+	+
11. *Ceriodaphnia rotunda* G. O. Sars		+	–	–	–
12. *Simocephalus vetulus* (O. F. Müller)		+	+	+	+
13. *Simocephalus expinosus* (Koch)		–	+	–	+
14. *Simocephalus expinosus* (Koch) var. *congener* Schoedler		–	–	–	+
15. *Scapholeberis mucronata* (O. F. Müller)		+	–	+	–
16. *Scapholeberis kingi* G. O. Sars		–	–	–	+
17. *Scapholeberis aurita* (Fischer)		–	–	–	+
18. *Moina rectirostis* (Leydig)		–	+	–	–
19. *Moina micrura* Kurz		–	–	–	+
20. *Moina brachiata* (Jurine)		+	–	–	–
21. *Bosmina (Bosmina) longirostris* (O. F. Müller)		+	+	–	+
22. *Bosmina (Bosmina) longirostris* (O. F. M.) var. *cornuta* Jurine		+	–	–	–
23. *Ilyocryptus sordidus* (Liévin)		–	–	+	+
24. *Macrothrix laticornis* (Jurine)		+	–	–	+
25. *Macrothrix hirsuticornis* Norman et Brady		–	+	+	–
26. *Eurycercus lamellatus* (O. F. Müller)		+	–	–	–
27. *Acroperus elongatus* (G. O. Sars)		+	–	–	–
28. *Acroperus harpae* (Baird)		+	–	–	–
29. *Tretocephala ambigua* (Lilljeborg)		–	+	+	–
30. *Oxyurella tenuicaudis* (G. O. Sars)		+	+	–	+
31. *Alona guttata* G. O. Sars		+	–	–	–
32. *Alona rectangula* G. O. Sars		+	+	+	+
33. *Alona quadrangularis* (O. F. Müller)		+	–	–	–
34. *Leydigia acanthercoides* (Fischer)		–	–	–	+
35. *Graptoleberis testudinaria* (Fischer)		+	–	–	–
36. *Alonella excisa* (Fischer)		+	–	+	+
37. *Pleuroxus laevis* G. O. Sars		+	–	–	–
38. *Pleuroxus trigonelleus* (O. F. Müller)		+	–	–	–
39. *Pleuroxus uncinatus* Baird		+	–	–	–
40. *Pleuroxus aduncus* (Jurine)		–	+	+	+
41. *Dunhevedia crassa* King		+	–	–	–
42. *Chydorus sphaericus* (O. F. Müller)		+	+	+	+
43. *Polyphemus pediculus* (Linnaeus)		–	+	+	+

Key to the abbreviations: t. s. = time of sampling; i. d. p. = imprint date of the publication

Table 2. Ostracoda species demonstrated up to now from Lake Fertő

Species		Daday	Imhof	Ponyi and Dévai
	t. s.	1890–1892	1966	1960–1961
	i. d. p.	1897 1900	1966	1976
1. *Ilyocypris gibba* (Ramdohr)		+	(+)	–
2. *Ilyocypris bradyi* G. O. Sars		–		+
3. *Notodromas monacha* (O. F. Müller)		+		+
4. *Cypris pubera* O. F. Müller		+		+
5. *Heterocypris incongruens* (Ramdohr)		+		–
6. *Heterocypris salina* Brady		–		+
7. *Cypridopsis newtoni* Brady et Robertson		+		–
8. *Cypridopsis vidua* (O. F. Müller)		+		–
9. *Potamocypris unicaudata* Schäfer		–		+
10. *Cyclocypris ovum* (Jurine)		–	(+)	+
11. *Cyclocypris laevis* (O. F. Müller)		+		+
12. *Cypria ophthalmica* (Jurine)		+		+
13. *Candona candida* (O. F. Müller)		+		–
14. *Candona parallela* G. W. Müller		–	+	–
15. *Candona fabaeformis* Fischer		+	+	–
16. *Limnocythere sancti-patricii* Brady et Robertson		+		–

Key to the abbreviations: t. s. = time of sampling; i. d. p. = imprint date of the publication; (+) = only the genus was indicated by the author

perus elongatus, A. harpae, Alona guttata, Alona quadrangularis, Graptoleberis testudinaria, Pleuroxus laevis, P. trigonellus, P. uncinatus, Dunhevedia crassa) could not be demonstrated since. In the fifties, Pesta (1954) found 18 Cladocera species, out of which only 8 agreed with those also included in Daday's list of the fauna. Zakovsek (1961) mentions 16 species in his study. Out of them 1 species *(Iliocryptus sordidus)* is not included either in Daday's or in Pesta's list. The exchange of the Cladocera faunule is proved by the fact that 10 years upon the thorough examinations of Pesta and Zakovsek we found 5 among the 22 species demonstrated by us, of which the presence in Lake Fertő was unknown before. These are as follows: *Sinocephalus expinosus* var. *congener* (in the opinion of certain authors, e. g. Srámek – Husek et al., 1962, a separate species), *Scapholeberis kingi, Scapholeberis aurita, Moina micrura, Leydigia acanthocercoides.*

5 species, i. e. 12% of the Cladocera could be continually demonstrated: *Diaphanosoma brachyurum, Daphnia longispina, Ceriodaphnia quadrangula, Alona rectangula, Chydorus sphaericus.* In connection with *Daphnia longispina*) we note that in the earlier literature (e. g. Wagler, 1937; Manuilova, 1964.) "*hyalina*" was ranked with *longispina.*

About the quantitative composition and changes of the Ostracoda faunule of Lake Fertő little is known, (Table 2), as no fauna examination of greater detail and thoroughness was done since Daday (1897, 1900). Imhof (1966) mentions only two species. Neither do we find detalis about the Ostracoda of the Lake in

Table 4. Comparison of the numbers of species of the Cladocera, Copepoda and Ostracoda of Lake Fertő and of „Seewinkel""

Suborder and subclass	Lake Fertő according to tables 1 – 3	Seewinkel (LÖFFLER, 1957)	Number of common species
Cladocera	42	16	14
Copepoda	22	14	9
Ostracoda	15	5	2

PESTA and also ourselves can report 15 and 14 species, respectively. A counter argument: the rising number of species finds its explanation not in a change in the environment but in the increased intensity of research. Still, if this were so also the total number of Cladocera should rise; however, the data show the opposite (DADAY demonstrated 25, PESTA and the authors of the present paper 12 and 22 species, respectively; cf. the data of Table 1). The technical shortcomings of the collection are eliminated, as the Copepoda and Cladocera are being caught together.

Recently a significant change ensued also in the faunule of the Copepoda although, as compared with the exchange within the given number of species of the Cladocera, it was of smaller measure. Three of the species mentioned by DADAY *(Macrocyclops fuscus, Paracyclops fimbriatus, Diacyclops nanus)* have not been recorded by any researcher since; we only found two species *(Nitocra hibernica, Thermocyclops dybowskii)* mentioned before (Table 3). In the years of collection between 1890 and 1961 only five species *(Arctodiaptomus spinosus, Eucyclops serrulatus, Cyclops strenuus, Acanthocyclops viridis, Mesocyclops leuckarti)*, consequently 23% of all demonstrated species were identical.

A comparison of the numbers of the Cladocera, Copepoda and Ostracoda species demonstrated from the minor waters of the Seewinkel and of Lake Fertő shows (Table 4) that the majority of the species of the Seewinkel are also to be found in the water of Lake Fertő; 87% in the case of Cladocera species, 64% in that of Copepoda species and 40% in that of the Ostracoda.

A general characterization of the habitats of Lake Fertő

The total area of the Lake is 322 km², of this 82 km² fall to Hungarian territory. Its greater part is covered with reeds, considered "cultivated reed" or "reed-fields put to agriculture" (TÓTH, SZABÓ, 1961). This means that, within the extensive reedy part a radial and transversal network of canals for boats was developed. The canals enclose so-called "reed-plots", from where the reed is cut down each year. Of course, this human interference can be perceived in the life of the reeds. The cleaning of the system of canals involves a continuous disturbance of the edges of the latter. Part of the extensive and uniform reed-fields are destroyed by the heavy tractors and great quantities of *Chara* may develop in their place.

Table 5. The chemical conditions of the open-water and reedy areas of Lake Fertő (Tóth, Szabó, 1961, average data of Tables 1 and 2)

	Open water	Water cowered with reeds
pH	8.8	8.0
O_2 mg/lit.	6.3	2.8
pH	8.8	8.0
pH	8.8	8.0
O_2 mg/lit.	6.3	2.8
El. conductivity $10f \times 18°C$	2058.1	2918.9
dry residue m /lit.	1707.9	1868.1
Ca^{++} mg/lit.	23.9	37.4
Mg^{++} mg/lit.	121.6	128.6
Na^{+} mg/lit.	412.6	413.5
K^{+} mg/lit.	38.3	29.6
CO_2 mg/lit.	0	2.3
CO_3^{-} mg/lit.	62.7	0
HCO^{-} mg/lit.	655.5	954.3
SO^{-} mg/lit.	446.3	451.4
Cl^{-} mg/lit.	227.4	245.7
alkalinity	13.8	15.8
C°	20.2	19.6
Ions total	1988.3	2260.5

The network of canals also affects the submersion of the reed-plots to a high degree. Owing to the varying height of the embankments the phenomenon is frequent that on one side the lower part of the reeds is still covered with water, while on the other it is not.

Table 6. Percentage composition of the

Species	m+h No. 35. (IV. 24.)	m No. 37. (IV. 25.)	m No. 36. (IV. 25.)	m No. 38. (IV. 25.)	m No. 43. (IV. 25.)
1. *Diaphanosoma brachyurum*	0.1	0.6	14.1	1.2	5.5
2. *Bosmina longirostris*	0.1	94.9	1.1	23.9	4.2
3. *Arctodiaptomus spinosus*	98.3	1.2	81.5	60.1	88.0
4. *Acanthocyclops vernalis*	0.3	0.7	–	–	–
5. *Chydorus sphaericus*	0.7	1.1	3.3	1.6	2.3
6. *Alona rectangula*	–	–	–	–	–
7. *Ceriodaphnia quadrangula*	–	–	–	–	–
8. *Eucyclops serrulatus*	0.5	–	–	2.8	–
9. *Moina micrura*	–	–	–	–	–
10. *Cyclops strenuus*	–	1.5	–	9.9	–
11. *Thermocyclops crassus*	–	–	–	–	–
12. *Mesocyclops leuckarti*	–	–	–	–	–
13. *Ceriodaphnia reticulata*	–	–	–	0.5	–
14. *Scapholeberis kingi*	–	–	–	–	–
15. *Oxyurella tenuicaudis*	–	–	–	–	–

Note: m = scooped sample; h = sample taken with net

According to Tóth and Szabó (1961), the reed-field can be divided into three distinct zones. *(1)* The thriving reed-stand in contact with the open water. of which the width depends on the effect of the open water. *(2)* The middle zone, more extensive than the preceding one, where the quality of the reed is somewhat inferior. *(3)* The stand interspersed with sedge and tussocks, situated behind the former is covered with water only in spring and late in autumn. As opposed to the conditions prevailing in Lake Balaton (Tóth, 1960), in the shallow and fluctuating water of the Fertő reed-fields no definite chemical zones can be formed. Thus no reed-types between the open water and the shore, succeeding one another in zones and well separable from each other could arise either.

According to Berczik and Andrikovics (1975) the main types of habitats in Lake Fertő are as follows: *(1)* open water *(2)* sediment and *(3)* areas overgrown with stalked plants, to be divided into weed-fields and reeds. In the course of our examinations – apart from the open-water sediments free from vegetation – we studied the Crustacea of all other habitats.

As to hydrochemistry, the habitats can be ranked with two groups, those of the open-water ones and those covered with reeds. Tóth and Szahó (1961) published chemical data of 7 open-water areas and 8 ones covered with reeds. From the comparison of the average values of these appears (Table 3), that in pH, O_2, conductivity, Ca^{++}, CO_2 and alkalinity there is a remarkable difference between the two groups of habitats. However, apart from CO_2 and CO_3^{--}, the difference is not significant. This is caused by the considerable movement of the water between the two "biotopes". Upon the effect of the north wind the open water of the Lake streams into the reeds and longitudinal canals – again, when the wind blows from the south, the eater streams back towards the open surface of the Lake.

Crustacea planktons of the „open water"

m No. 1. (VII. 12.)	h No. 11. (VII. 15.)	m No. 15. (VIII. 16.)	m No. 18. (VIII. 17.)	m No. 21. (VIII. 18.)	m No. 27. (IX. 14.)	m No. 33. (IX. 15.)
30.2	49.6	36.1	49.4	50.2	22.3	0.6
8.9	2.2	58.3	0.3	–	71.7	98.4
4.7	38.6	–	28.0	26.1	–	–
56.2	5.8	–	20.0	20.9	–	–
–	0.1	2.8	0.3	–	0.4	–
–	0.1	2.8	1.7	0.9	–	–
–	–	–	–	1.9	–	0.6
–	–	–	–	–	–	–
–	–	–	–	–	0.8	0.4
–	–	–	–	–	–	–
–	–	–	–	–	4.4	–
–	3.6	–	–	–	–	–
–	–	–	–	–	–	–
–	–	–	–	–	0.4	–
–	–	–	0.3	–	–	–

The Crustacea-plankton association of the open water

By the term "open water" we mean the wider water surfaces free of reeds. They can be divided into the following "subtypes" *(a)* extensive open water surface exposed to wind action (e. g. collecting site No. 21); *(b)* water surface more or less surrounded by reeds, still, in direct connection with open water proper (e. g. sites of collection No. 11 and 35); *(c)* water surface completely surrounded by reeds (e. g. the "Herrenlacken" or sites No. 37 and 38); *(d)* the canals free of reeds, which are similarly directly connected with open water proper (e. g. collecting sites No. 12 and 22).

In the open-water marked *(a)*, *(b)* and *(c)* we demonstrated 15 species of Crustacea (Table 6). In quantitative respect, however, only a few species are of importance. In the period of warm weather (July–September) the association *Diaphanosoma brachyurum – Bosmina longirostris – Acanthocyclops vernalis – Arctodiaptomus spinosus* is characteristic. If one also takes consideration the spring examination period (April), then, considering the whole period, the association *Diaphanosoma – Bosmina – Arctodiaptomus – Chydorus* is dominant. Both Crustacea associations differ somewhat from the conditions described regarding the open water of the Austrian part of the Lake (LÖFFLER, 1974). There, namely, the open-water Crustacea plankton can be characterized by the *Diaphanosoma-Arctodiaptomus* association in summer, while in the Hungarian part *Acanthocyclops vernalis* and *Bosmina longirostris* modify these propositions.

In the plankton of the canals we could demonstrate 20 species of Crustacea (Table 7), out of which 11 turned up to on the occasion of only one collection. Relying upon frequency of occurrence, the Crustacea plankton of the canals can be characterized by the association *Arctodiaptomus-Bosmina-Chydorus(-Acanthocyclops vernalis)*, which is identical with the one of the open water. This is a further proof of the connection of the canals with the open water proper.

In the open water we examined the plant islets of *Myriophyllum spicatum* and *Typha angustifolia*. The 16 species demonstrated there agree – excepting 2–3 – with those found in the open water, however, the proportions of coccurrence are different (Table 8). This type of habitat can be characterized by the following Crustacea association: *Alona rectangula – Acanthocyclops vernalis-Diaphanosoma brachyurum – Bosmina longirostris.*

We could examine the aquatic plants of the canals only on two occasions (Table 9). It seems that *Simocephalus vetulus* will be the characteristic species of Crustacea of these habitats.

The composition of Crustacea of the open-water plankton of Lakes Fertő and Balaton collected at an identical period indicates (Table 10) that in both shallow lakes *Diaphanosoma* has a most important role, since in the warm period it forms a considerable per cent of the Crustacea associations (Fertő: 11–45%; Balaton: 17–33%). A further analogy: in both lakes 70–90% of the Crustacea association of the plankton is formed by three species species of Crustacea. Of them one species is common in the two lakes, the other one is represented by a *Diaptomus* in each of them *(Eu-* and *Arctodiaptomus*, respectively), the third is *Acanthocyclops vernalis* and *Bosmina longirostris*, respectively, which is to be found in the somewhat eutrophic areas of Lake Balaton, as well. Although in chemical respect (e. g. Na^+-, or total salt content) there are considerable diffe-

Table 7. The Crustacea plankton of the canal water

Species	No. 12. h VII. 15.	No. 19. h VIII. 17.	No. 22. m VIII. 18.	No. 23. h VIII. 18.	No. 25. m VIII. 18.	No. 28. h IX. 14.	No. 40. m IV. 25.
1. *Diaphanosoma brachyurum*	4.5	40,4	63.6	51.2	65.6	–	8.8
2. *Arctodiaptomus spinosus*	49.0	21.1	25.0	6.1	–	18.0	90.7
3. *Bosmina longirostris*	–	–	2.3	–	34.4	24.8	0.3
4. *Chydorus sparicus*	2.9	–	–	1.2	–	14.8	0.2
5. *Acanthocyclops vernalis*	–	26.3	5.7	25.6	–	–	–
6. *Mesocyclops leuckarti*	35.1	–	2.3	–	–	–	–
7. *Ceriodaphina reticulata*	6.9	12.2	–	–	–	–	–
8. *Simocephalus vetulus*	–	–	–	–	–	1.5	–
9. *Cyclops strenuus*	–	–	–	–	–	23.7	–
10. *Diacyclops bicuspidatus*	–	–	–	–	–	10.3	–
11. *Acanthocyclops viridis*	–	–	–	6.1	–	–	–
12. *Asellus aquaticus*	–	–	–	4.9	–	0.3	–
13. *Campthocamptus staphylinus*	–	–	–	–	–	3.8	–
14. *Eucyclops speratus*	–	–	–	–	–	2.7	–
15. *Ceriodaphnia laticaudata*	–	–	–	2.4	–	–	–
16. *Scapholeberis kingi*	1.6	–	–	–	–	–	–
17. *Alona rectangula*	–	–	–	1.2	–	–	–
18. *Oxyurella tenuicaudis*	–	–	–	1.2	–	–	–
19. *Potamocypris unicaudata*	–	–	1.1	–	–	–	–
20. *Cyclocypris laevis*	–	–	–	–	–	+	–

Note: m = scooped sample; h = sample taken with net

Table 8. The Crustacea of the open-water pondweed field

	Myriophyllum (Typha)					
	m	h	b	m	h	h
	No. 2.	No. 3.	No. 6/a.	No. 6/b.	No. 7.	No. 4/a.
	(VII. 12.)	(VII. 12.)	(VII. 14.)	(VII. 14.)	(VII. 14.)	(VII. 12.)
1. *Alona rectangula*	89.4	4.2	86.9	7.6	2.1	5.3
2. *Acanthocyclpos vernalis*	2.4	43.1	–	35.3	12.7	70.8
3. *Diaphanosoma brachyurum*	2.4	19.7	–	6.4	41.0	12.3
4. *Bosmina longirostris*	–	19.4	5.4	15.3	31.0	7.0
5. *Chydorus shpaericus*	0.8	–	6.8	2.4	3.1	1.7
6. *Arctodiaptomus spinosus*	1.6	6.5	–	–	3.1	–
7. *Ceriodaphnia reticulata*	–	0.6	–	–	0.4	1.2
8. *Ceriodaphnia quadrangula*	–	1.1	–	16.1	–	–
9. *Mesocyclops leuckarti*	–	–	–	14.5	2.2	–
10. *Simocephalus vetulus*	–	–	–	2.4	1.8	–
11. *Thermocyclops crassus*	–	5.1	0.9	–	–	–
12. *Acanthocyclops viridis*	–	–	–	–	2.6	–
13. *Nitocra hibernica*	2.4	–	–	–	–	–
14. *Moina micrura*	–	–	–	–	–	1.7
15. *Asellus aquaticus*	0.8	–	–	–	–	–
16. *Oxyurella tenuicaudis*	–	0.3	–	–	–	–

Note: m = sampling scooped from among pondweeds; h = sampling with net among pondweeds; b = pondweed coating

Table 9. Crustacea of the aquatic plants of the edge of the canals, in per cent

Species	No. 13. h. (reed-sedge) VII. 15.	No. 26. h. (pondweed-slack water) VIII. 18.
1. *Simocephalus vetulus*	61.5	32.0
2. *Macrocyclops fuscus*	–	28.0
3. *Eucyclops sperratus*	–	16.0
4. *Mesocyclops leuckarti*	15.4	–
5. *Ceriodaphnia quadrangula*	15.4	–
6. *Simocephalus v. congener*	–	8.0
7. *Scapholeberis kingi*	7.7	–
8. *Ilyocryptus sordidus*	–	4.0
9. *Acanthocyclops viridis*	–	4.0
10. *Thermocyclops dybowskyi*	–	4.0
11. *Cryptocyclops bicolor*	–	4.0

Table 10. Comparison of the Crustacea associations of the planktons, in per cent of Lakes Fertő and Balaton in identical periods

Lake Fertő	Balaton (Ponyi, 1968)
July	
Diaphanosoma brachyurum (40%)	*Diaphanosoma brachyurum* (33%)
Acanthocyclops vernalis (31%)	*Eudiaptomus gracilis* (33%)
Arctodiaptomus spinosus (22%)	*Mesocyclops leuckarti* (27%)
August	
Diaphanosoma brachyurum (45%)	*Eudiaptomus gracilis* (52%)
Bosmina longirostris (20%)	*Diaphanosoma brachyurum* (22%)
Arctodiaptomus spinosus (18%)	*Mesocyclops leuckarti* (19%)
September	
Bosmina longirostris (85%)	*Ediaptomus gracilis* (41%)
Diaphanosoma brachyurum (11%)	*Diaphanosoma brachyurum* (17%)
	Mesocyclops leuckarti (16%)

rences between the two lakes, in certain respects (e. g. shallowness, water disturbances caused by wind action), there are also numerous similar features. The latter is confirmed by the analysis of the Crustacea associations, as far as open waters are concerned.

Table 11. The Crustacea fauna of the water covered by reeds of Lake Fertő

Species	Data of							
	U h N. 5. VII. 12.	U h No. 8. VII. 14.	D m No. 9/c VII. 14.	D m No. 14. VII. 15.	D sz No. 9/a. VII. 14.	D mo No. 9/b. VII. 14.	C h No. 30. IX. 14.	P h No. 39. IV. 25.
Chydorus sphaericus	1.7	25.8	9.8	25.0	14 4	32.6	12.5	0.2
Acanthocyclops viridis	–	6.1	14.1	3.5	5.2	11.6	25.0	–
Pleuroxus aduncus	1.5	8.2	28.3	53.6	35.0	37.2	–	–
Ceriodaphnia reticulata	26.6	–	–	–	–	–	–	0.2
Daphnia curvirostris	63.2	–	–	–	–	–	25.0	98.3
Simocephalus expinosus	2.5	4.8	5.4	–	3.1	–	–	0.6
Scapholeberis kingi	–	4.8	–	–	–	–	25.0	–
Ceriodaphnia laticaudata	–	43.5	32.6	17.9	1.0	7.0	–	–
Eucyclops serrulatus	0.8	2.7	–	–	–	–	–	0.2
Scapholeberis aurita	2.2	–	3.2	–	–	2.3	–	–
Alonella excisa	–	–	2.2	–	22.7	2.3	–	–
Mesocyclops leuckarti	–	–	–	–	–	–	–	–
Cyclops strenuus	–	–	–	–	–	–	–	0.5
Eucyclops speratus	–	–	–	–	–	–	–	–
Asellus aquaticus	–	–	–	–	1.0	7.0	–	–
Acanthocyclops vernalis	–	–	4.4	–	–	–	–	–
Diaphanosoma brachyurum	0.2	0.7	–	–	–	–	–	–
Arctodiaptomus spinosus	–	–	–	–	–	–	–	–
Alona rectangula	–	–	–	–	–	–	12.5	–
Simocephalus betulus	–	–	–	–	–	–	–	–
Heterocypris salina	–	–	–	–	–	–	–	–
Potamocypris unicaudata	–	–	–	–	–	–	–	–
Simocephalus vet. v. congener	–	–	–	–	–	–	–	–
Cyclocypris ovum	–	–	–	–	13.4	–	–	–
Canthocapmtus staphylinus	–	–	–	–	–	–	–	–
Ilyocriptus sordidus	–	–	–	–	–	–	–	–
Bosmina longirostris	–	3.4	–	–	–	–	–	–
Cyclocypris laevis	–	–	–	–	3.1	–	–	–
Macrothrix laticornis	–	–	–	–	–	–	–	–
Cypris pubera	1.2	–	–	–	–	–	–	–
Leydigia acanthoceroides	–	–	–	–	–	–	–	–
Cypria ophthalmica	–	–	–	–	1.0	–	–	–
Ilyocypris bradyi	–	–	–	–	–	–	–	–
Polyphemus pediculus	–	–	–	–	–	–	–	–
Daphnia hyalina	–	–	–	–	–	–	–	–
Notodromas monacha	0.2	–	–	–	–	–	–	–

Note: U = *Utricularia;* D = *Drepanocladus;* C = *Chara;* P = reed-field; h = sample taken with net; m = scooped sample; mo = filamentous algae; sz = water filtered plants; T = pool in clearings surrounded by reeds; + = 0,1 per cent

The Crustacea of the water covered with reeds

We examined the Crustacea faunule of two types of reed-fields, out of which one is Scirpeto-Phragmitetum. This reed-zone has a stand of intensive growth and closed character. The other is Scirpeto-Phragmitetum utriculariosum which can be characterized by a mass vegetation of *Utricularia vulgaris* (TÓTH & SZABÓ, 1976). The stand mentioned second also has a form characterized by a mass vegetation of *Drepanocladus aduncus* var. *kneiffii*. It occurs in places where the water begins to disappear from under the reeds, and the *Utricularia* begins to decay.

From the water surface covered with reeds we demonstrated 35 species and 1 variety. If we compare the Crustacea associations of the two types of reeds as to frequency and percentual composition (Table 11), we shall find a difference. While of the reed-type Sc.-Ph. utriculariosum the presence of *Chydorus sphaeritus – Pleuroxus aduncus – Acanthocyclops viridis – Ceriodaphnia laticaudata,*

(The figures mean percentual composition)

ollection

P h No. 41. IV. 25.	P h No. 42. IV. 25.	P h No. 10/a. VII. 14.	P h No. 10/b VII. 14.	P h No. 16. VIII. 16.	P h No. 17. VIII. 16.	P h No. 20. VIII. 17.	P h No. 31. IX. 15.	P h No. 32. IX. 15.	P m No. 34/a. XII. 20.	P h No. 34/b. XII. 20.	T m No. 24. VIII. 18.	T h No. 29. IX. 15.
6.7	–	+	6.0	0.6	–	50.0	–	11.1	9.7	1.1	2.4	6.6
6.7	9.6	+	6.0	1.6	–	–	26.1	–	–	0.8	19.0	2.0
–	7.9	+	18.0	1.1	–	–	4.3	7.4	–	–	–	–
–	34.9	11.5	30.0	34.2	57.1	–	52.2	81.5	32.2	–	2.4	24.7
50.0	23.8	75.0	–	–	–	–	–	–	–	86.7	–	19,7
–	7.9	+	2.0	–	–	–	–	–	–	–	–	26.3
–	1.6	13.5	8.0	–	–	–	17.4	–	–	–	4.8	2.5
–	–	–	–	58.7	42.9	–	–	–	–	–	–	–
13.3	–	+	–	–	–	–	–	–	–	–	30.9	–
–	1.6	+	4.0	–	–	–	–	–	–	–	–	0.4
–	–	+	4.0	–	–	–	–	–	–	–	–	–
–	–	+	8.0	3.8	–	50.0	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	16.1	2.3	–	–
–	–	–	–	–	–	–	–	–	9.7	0.7	–	1.6
–	–	–	–	–	–	–	–	–	3.2	–	–	–
–	–	+	4.0	–	–	–	–	–	–	–	–	–
–	1.6	–	–	–	–	–	–	–	–	–	–	–
13.3	11.1	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	11.5
10.0	–	–	10.0	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	14.3	2.0
–	–	–	–	–	–	–	–	–	–	–	11.9	0.8
–	–	–	–	–	–	–	–	–	3.2	8.4	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	25.8	–	–	–
–	–	–	–	–	–	–	–	–	–	–	11.9	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	2.4	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	0.8
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	+	–	–	–	–	–	–	–	–	–	–
–	–	+	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–

of the reed-type Sc.-Ph. phragmitetosum the occurrence of *Ceriodaphnia reticulata – Chydorus sphaericus – Acanthocyclops viridis – Daphnia curvirostris* association is characteristic.

During the examinations it could be regarded as a special point of interest, that in the small "openings" of a few square metres extent of Sc.-Ph. phragmitetosum, where no undergrowth developed, we also found the Ostracoda species *Heterocypris salina* and *Potamocypris unicaudata.*

In the course of the examinations only one opportunity presented itself for simultaneously studying the composition of the Crustacea as to species along a complete cross-section (open water – pondweed-field-reeds) (Table 12). Even this examination was sufficient for proving that also in the reeds of Lake Fertő a peculiar "zones" can be formed which, however, differs from the conditions to be observed in the Balaton reeds (Ponyi, 1962). If one compares the number of Cladocera, Copepoda and Ostracoda species found in the reeds of Lakes Fertő

Table 12. Percentual distribution of the Crustacea species along the cross-section: open water — pondweed — reeds (July 12th, 1960)

Type of collecting site:	open water	open water pondweed	open water and open water pondweed together	rushy reed fringe	coating of rushes	reeds with *Utricularia*
Species Coll.p.No.	1	2	3	4/a	4/b	5
Acanthocyclops vernalis	**56,2**	2.4	**43,1**	**70,8**	–	–
Diaphanosoma brachyurum	**30,2**	2.4	19.7	12.3	–	0.2
Bosmina longirostris	8.9	–	19.4	7.0	–	–
Arctodiaptomus spinosus	4.7	1.6	6.5	–	–	–
Alona rectangula	–	**89,4**	4.2	5.3	**54,8**	–
Nitocra hibernica	–	2.4	–	–	9.7	–
Asellus aquaticus	–	0.8	–	–	–	–
Ceriodaphnia reticulata	–	–	0.6	1.2	–	**26,6**
Thermocyclops crassus	–	–	5.1	–	–	–
Ceriodaphnia quadrangula	–	–	1.1	–	–	–
Oxyurella tenuicaudis	–	–	0.3	–	–	–
Moina micrura	–	–	–	1.7	–	–
Daphnia curvirostris	–	–	–	–	–	**63,2**
Simocephalus expinosus	–	–	–	–	–	2.5
Scapholeberis aurita	–	–	–	–	–	2.2
Pleuroxus aduncus	–	–	–	–	–	1.5
Cypris pubera	–	–	–	–	–	1.2
Eucyclops serrulatus	–	–	–	–	–	0.8
Notodromas monacha	–	–	–	–	–	0.2

Note: Coll. p. = collecting places

Table 13. Comparison of the numbers of species and varieties of Cladocera, Copepoda and Ostracoda demonstrated from the reed-fields of Lakes Fertő and Balaton

Suborder or subclass	Lake Fertő (Table 11)	Balaton (PONYI, 1962)	number of common species
Cladocera	20	20	8
Copepoda	8	18	4
Ostracoda	7	7	2
Total	35	45	14

and Balaton (Table 13), one finds that out of the 25 and 11 species, respectively, only 14 are common in both. Among others also this refers to the different character of the two lakes.

Summary

The authors studied the Crustacea in samples taken from 43 sites of collection in the Hungarian area of Lake Fertő in the years 1960–61. In the course of the examinations they demonstrated 22 Cladocera, 8 Ostracoda, 14 Copepoda and 1 Isopoda species.

Comparing their results with earlier literary data, they found that, as compared with the 1900s, a considerable exchange of species took place in the Cladocera faunule.

Out of the 11 Ostracoda species mentioned by DADAY, the authors only found four. Together with the above, the "disappearance" of the genera *Cypridopsis* and *Limnocythere* refers to a considerable change of the lacustrine environment.

From among the Ostracoda species, *Potamocypris unicaudata* SCHÄFER is new to the fauna of Hungary. 5 Cladocera, 4 Ostracoda and Copepoda species were found to be similarly new for the fauna of Lake Fertő.

In the summer season the open-water Crustacea association is characterized by the species *Diaphanosoma brachyurum – Bosmina longirostris – Acanthocyclops vernalis – Arctodiaptomus spinosus*. In April the presence of *Chydorus sphaericus* in place of *Acanthocyclops vernalis* has a greater significance. The composition of the Crustacea association somewhat differs from that found in the open water of the Austrian part of the Lake, since in that part the summer open-water Crustacea plankton is determined by the species *Diaphanosoma – Arctodiaptomus*.

The open-water pondweed field can be characterized by the *Alona rectangula – Acanthocyclops vernalis – Diaphanosoma brachyurum – Bosmina longirostris* Crustacea association.

In the two different reed-fields the authors found different associations of Crustacea. Of Scirpeto–Phragmitetum phragmitetosum the joint occurrence of *Ceriodaphnia reticulata – Chydorus sphaericus – Acanthocyclops viridis – Daph-*

nia curvirostris is characteristic; — of the type, Sc.-Ph.-Ph. utriculariosum the Crustacea association: *Chydorus sphaericus — Pleuroxus aduncus — Acanthocyclops viridis — Ceriodaphnia laticaudata* is characteristic.

REFERENCES

1. Andrikovics S. & Berczik Á. (1975): *Hidrobiológia — zoológia.* — In: A Fertő-táj Monográfiát előkészítő adatgyűjtemény 3. Természeti adottságok: A Fertő-táj bioszférája, Kézirat. VITUKI, 423–436.
2. Andrikovics S. & Berczik Á. (1975 *a*): *Állattani adatgyűjtemény (körszájúak, halak és madarak nélkül).* In: A Fertő-táj Monográfiát előkészítő adatgyűjtemény 3. Természeti adottságok: A Fertő-táj bioszférája. Kézirat. VITUKI, 437–537.
3. Balogh J. (1953): *A zoocönológia alapjai. (Grundzüge der Zoozönologie.)* — Akadémiai Kiadó, pp. 248.
4. Daday J. (1890): *A magyarországi Diaptomus-fajok átnézete. (Conspectus Diaptomorum faunae Hungariae.)* — Természetrajzi Füzetek, 13: 114–180.
5. Daday J. (1891): *Adatok Magyarország édesvízi mikroszkópos faunájának ismeretéhez.* — Természetrajzi Füzetek, 14; 16–31.
6. Daday J. (1897): *A magyarországi tavak halainak természetes tápláléka. (A magyarországi tavak mikroszkópi állatvilága.)* — A Kir. Magyar Term. tud. Társulat, Budapest, pp. 481.
7. Daday J. (1900): *A magyarországi kagylósrákok magánrajzu. Ostracoda Hungariae.* — MTA. Budapest, pp. 320.
8. Farkas H. (1958): *Kagylósrákok, Ostracoda.* — In: Magyarország Állatvilága, IV, 3, Akad. Kiadó, Budapest, 2–68.
9. Iharos Gy. (1964): *A balatoni nádasok bevonatának Tardigradái. (Die Tardigraden des Peri-phyton der Röhrichte im Balaton–See.)* — Állatt. Közlem., 51: 49–53.
10. Imhof G. (1966): *Ökologische Gliederung des Schilfgürtels am Neusiedler See und Übersicht über die Bodenfauna unter produktionsbiologischen Aspekt.* — Sitz. ber. Österr. Akad. Wiss., math.-nat. Kl. Abt. I, 175: 219–235.
11. Lászlóffy W. (1972): *A Fertő-táj bibliográfiája. (Bibliographie des Neusiedlersee-Gebiete.)* — Győr-Sopron Megyei Tanács, Győr, pp. 294.
12. Löffler, H. (1957): *Vergleichende limnologische Untersuchungen an den Gewässern des Seewinkels (Burgenland). I. Der winterliche Zustand der Gewässer und deren Entomostrakenfauna.* — Verh. Zool.-Bot. Gesell. in Wien, 97: 27–52.
13. Löffler, H. (1974): *Der Neusiedlersee. Naturgeschichte eines Steppensees.* — Verl. F. Molden, Wien–München–Zürich, pp. 175.
14. Manujlova, E. F. (1964): *Vetvisztouszüe racski (Cladocera).* — Fauna Sz. Sz. Sz. R., Izdat. Nauk., Moszkva–Leningrád, 88: pp. 326.
15. Pesta, O. (1954): *Studien über Entomostrakenfauna des Neusiedler Sees.* — Wiss. Arb. Bgld., Eisenstadt, pp. 84.
16. Ponyi J. (1956): *A balatoni hínárosok Crustaceáinak vizsgálata. (Untersuchungen an Crustaceen in Tanggebilden des Balatons).* — Állatt. Közlem., 45: 107–121.
17. Ponyi, J. E. (1962): *Zoologische Untersuchung der Röhrichte des Balaton I. Krebse (Crustacea).* — Annal. Biol. Tihany, 29: 129–163.
18. Ponyi, J. E. (1968): *Studien über das Crustaceen-Plankton des Balaton IV. Beiträge zur Kenntnis der in der Krebsgemeinschaft des Sees horizontal auftretenden Veränderungen.* — Annal. Biol, Tihany, 35: 169–182.

19. Ponyi, L. (1965): *Zoologische Untersuchungen der Röhrichte des Balaton II. Wassermilben (Hydracarina).* – Annal. Biol. Tihany, 32: 175–186.

20. Schäfer, H., W. (1943): *Über zwei neuen deutsche Arten der Süsswasser-Ostracoden.* – Zool. Anz., 143: 210–216.

21. Šrámek–Hušek, R. M. Straskraba & J. Brtek (1962): *Lupenonožci Branchiopoda.* – Fauna CSSR, S. 16, Ceskoslov. Akad. Věd, Praha, pp. 470.

22. Szabó E. (1962): *A Fertő tó vizének kémiai tulajdonságai.* – Hidrol. Tájékoztató, December, 146–150.

23. Tóth, L. (1960): *Phytozönologische Untersuchungen über die röhrichte des Balaton–Sees.* – Annal. Biol. Tihany, 27: 209–242.

24. Tóth, L. (1960/a): *A Fontinalis antipyretica L. cenológiai szerepe a Balaton nádasaiban.* – Hidrol. Közlem., 2: 164–166.

25. Tóth, L. & E. Szabó (1961): *Zönologische und ökologische Untersuchungen in den Röhrichte des Neusiedlersees (Fertő-tó).* – Annal. Biol. Tihany, 28: 151–168.

26. Wagler, E. (1937): *Crustacea, Krebstiere,* in: Tierwelt Mitteleuropas, II, 2, pp. 224.

27. Zakovsek, G. (1961): *Jahreszyklische Untersuchungen am Zooplanton des Neusiedlersees mit Berücksichtigung der meteorologischen und chemischen Verhältnisse.* – Wiss. Arb. Bgld., Eisenstadt, pp. 85.

Table 3. Copepoda species demonstrated up to now from Lake Fertő

Species	t. s.	Daday	Pesta	Zakovcek	Ponyi and Dévai
		1890 – 1892	1950 1952	1950 – 1952	1960 – 1961
	i. d. p.	1890 1891 1897	1954	1961	1976
1. *Eudiaptomus vulgaris* (Schmeil)		+	–	–	–
2. *Arctodiaptomus bacillifer* (Koelbel)		–	–	+	–
3. *Arctodiaptomus spinosus* (Daday)		+	+	+	+
4. *Mixodiaptomus kupelwieseri* (Brehm)		–	+	+	–
5. *Macrocyclops albidus* (Jurine)		+	–	–	–
6. *Macrocyclops fuscus* (Jurine)		–	+	+	+
7. *Eucyclops serrulatus* (Fischer)		+	+	+	+
8. *Eucyclops speratus* (Lilljeborg)		–	+	–	+
9. *Paracyclops fimbriatus* (Fischer)		+	–	–	–
10. *Cyclops strenuus strenuus* (Fischer)		+	+	+	+
11. *Acanthocyclops (Acanthocyclops) vernalis* (Fischer)		–	+	+	+
12. *Acanthocyclops (Megacyclops) viridis viridis* (Jurine)		+	+	+	+
13. *Diacyclops bicuspidatus* (Claus)		–	+	+	+
14. *Diacyclops nanus* (G. O. Sars)		+	–	–	–
15. *Cryptocyclops bicolor* (G. O. Sars)		–	+	+	+
16. *Microcyclops varicans* (G. O. Sars)		–	+	+	–
17. *Mesocyclops leuckarti* (Claus)		+	+	+	+
18. *Thermocyclops crassus* (Fischer)		–	+	–	+
19. *Thermocyclops dybowskii* (Landé)		–	–	–	+
20. *Nitocra hibernica* (Brady)		–	–	–	+
21. *Canthocamptus staphylinus* (Jurine)		+	+	–	+
22. *Attheyella (Mrázekiella) trispinosa* (Brady)		–	+	–	–

Key to the abbreviations: t. s. = time of sampling; i. d. p. = imprint date of the publication

Löffler's (1974) book. Out of the 11 species demonstrated by Daday we could only find four. The present absence of the genera *Cypridopsis* and *Limnocythera* may similarly be indicative of some degree of change of the environment.

Out of the Ostracoda species, *Potamocypris unicaudata* Schäfer proved new for the fauna of Hungary. This species was described by Schäfer (1943) from of the lagoons of the Kiel bay (Barsbeker Lake), as well as from a canal which was in direct connection with the Baltic Sea. In the former site specimens turned up from the coating of reeds, in the latter one from that of piles. As to salt content, both sites of collection belonged to the oligohaline type, their NaCl content per litre was 396 – 709 mg, which means that the Cl^- content was below 300mg/litre. In Lake Fertő this species was found in collecting sites No. 23, 24 and 29, where the Cl^- content was 246 mg/litre (Table 5).

Löffler (1957) found *P. unicaudata* in some of the pools of "Seewinkel", where the Cl^- content was below a value of 50 mg/litre.

As shown by our examinations, since Daday the number of species of the Copepoda shows a rising tendency (Table 3). While Daday mentioned 10 species,