

QUALITATIVE AND QUANTITATIVE STUDIES ON THE AMPHIPODA IN LAKE BALATON AT TIHANY

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Qualitative and quantitative analyses of Amphipods of Lake Balaton were done by several authors between 1934 and 1974 (SEBESTYEN 1934, MOON 1934, MESCHKAT 1934, ENTZ 1943, 1947, PONYI 1956, 1957, 1962, PONYI et al. 1971, BIRO and GULYAS 1974). Quantitative data were obtained by MESCHKAT (1934) on the periphyton of reed and by ENTZ (1947) as well as by BIRO and GULYAS (1974) on higher aquatic vegetation. Ponyi and coworkers studied the benthic fauna including the amphipods in 1971. Eight species have been recorded, some of them in the earlier years (for instance *Gammarus roeseli*), other after their propagation in the 60's, for instance *Dikerogammarus* species.

The aim of our studies was to have a general picture on the quantitative distribution of the amphipod fauna near the Tihany peninsula in the submerged aquatic vegetation along the shores and in the stony littoral areas. A further goal was to see whether there are differences in the species composition, the size distribution and productivity of the different amphipods on different substrata. Furtheron I tried to answer the question, whether there were differences in the development of the amphipod fauna between the years 1983 and 1985 in the same seasons and localities within the aquatic vegetation.

I tried, based on my own results, to show the differences between the data of previous years given in the literature and the present situation.

Materials and methods

The stations of collections can be seen on Fig.1. The dates of collection were as follows: August 1983 in submerged macrovegetation and in the stony littoral zone, August 1985 in the submerged vegetation.

The sampling was carried out according to the method of DORGELÓ (1977). The submerged stones were displaced carefully, holding a hand net under the stones in order to avoid the loss of amphipods. The stones were then placed on tray and washed thoroughly until no more animal were found in the washing water. Since the stones had an algal coating and the amphipods lived among the algae clinging tightly to the filaments so that it was difficult to wash them out even by careful washing. I think that by this way we obtained fairly good quantitative data. The surface of the stones measured approximately. To determine the biomass the dry weight of eggs and animals was determined. Further details are to be published elsewhere (MUSKO, in preparation).

Results and conclusions

There were altogether three species of amphipods in the material collected: *Corophium curvispinum* Sars, *Dikerogammarus haemobaphes* Eichw. and *Dikerogammarus villosus* Sow.

In the weed stands as well as in the stony shore zones the bulk of amphipods was formed by *Corophium* (80-90 %) (Fig.2). *Dikerogammarus haemobaphes* was present in much lower numbers, and *Dikerogammarus villosus* was generally present everywhere but in very low numbers.

There were remarkable differences between the aquatic weeds and the stony littoral zones, insofar as *Corophium* was present in about 92 percent in the submerged vegetation and only in 78 % in the stony littoral zones (Fig.2).

In 1985 according to parallel collections carried out from the same localities the proportion of *Corophium* was higher on *Myriophyllum spicatum* than on *Potamogeton perfoliatus* stands.

The distribution of the animals was studied according to their sizes. For this reason by *Corophium* the following size groups were established: from 0 to 1 mm, from 1 to 3 mm, from 3 to 5 mm and from 5 to 7 mm. The distribution in sizes of *Corophium* depends on the locality and the macrophyta species in question. In general the proportion of juveniles (0-1 mm) were the lowest on both weed species at both collecting times near the waterworks (sewage inlet). By *Dikerogammarus haemobaphes* and *D.villosus* the following size groups were considered: 0-2 mm, 2-4 mm, 4-7 mm, and 7-10 mm. There were generally egg carrying females among the size groups 4-7 and 7-10 by *D.haemobaphes* and *D.villosus*. Station 3 is an exception in that there were no egg carrying females among the size groups 4-7 and 7-10 mm of *D.haemobaphes*. The same occurred by *D.villosus* in 1983.

The mean numbers of eggs per female ranged from 3.3 to 8.8 by *Corophium*. Generally it can be stated that the productivity is higher within the macrovegetation than in the stony littoral zones (Table 1). The productivity in the weed stands was much lower in 1985 than in 1983. It is remarkable that in front of the waterworks (station 3) the mean egg numbers per female were consequently low (ranging from 5.3 to 5.85), both in 1983 and 1985, independently from the species composition of the weed stands. This station is an exception also referring to the productivity of *D. haemobaphes*, inasmuch as no egg carrying females could be detected here. As for *D.villosus*, there were no egg carrying females on station 3 in 1983, but they appeared there in 1985.

The biomass data are seen on Table 2. The greatest biomass of *Corophium* was in 1985 at station 3 where it was higher in a *Myriophyllum* stand than that of *Potamogeton*. Accordingly there is the same proportion of total numbers of individuals per g aquatic plant, in contrast to ENTZ (1947) who stated, based on quantitative analysis in the macrovegetation (*Potamogeton* and *Myriophyllum*) in front of the Institute, that there were relatively more *Corophium* specimens on *Potamogeton* than on *Myriophyllum*. Regarding the size distribution of *Corophium* it can be said that at the waterworks (station 3) there were very low numbers of juveniles as compared to the relative high total biomass in 1983 as well as in 1985.

Regarding *D.haemobaphes* the greatest biomass was found at station 3 in 1983 and at station 1 in 1985.

The biomass of *D.villosus* was the highest in 1983 at station 1 and in 1985 at station 3 on *Potamogeton*.

The mean values of the biomass of all Amphipods in the weed stands in 1983 were 0.6 mg animal dry weight/g plant wet weight in 1985 growing to 1.2 mg animal dry weight/g plant wet weight in 1985. The mean biomass on stony shores was 15 mg animal dry weight/m² stone surface in 1983.

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References

- BIRO, K., P.GULYAS, 1974: Zoological investigations in the open water *Potamogeton perfoliatus* stands of Lake Balaton. *Annal.Biol.Tihany*, 41: 181-203.
- DORGELI, J., 1977: Comparative ecophysiology of two intertidal gammarids and the problem of zonation. *Crustaceana Suppl.*, 4, 65-80.
- ENTZ, B., 1943: Adatok a magyarországi *Corophium curvispinum* G.O. Sars forma devium Wundsch alakjának és biológiájához, *MBKM*, 15: 3-41.
- ENTZ, B., 1947: Quantitative and qualitative studies in the coatings of *Potamogeton perfoliatus* and *Myriophyllum spicatum* in lake Balaton. *MBKM*, 17: 17-37.
- MESCHKAT, A., 1934: Der Bewuchs in den Röhrichte des Plattensees. *Arch.Hydrobiol.*, 27: 436-517.
- MOON, H.P., 1934: A quantitative survey of the Balaton mud fauna. *Arch.Ungar.Biol.Forsch.-Inst.*, 7: 170-189.
- PONYI, J.E., 1956: Ökologische, ernährungsbiologische und systematische Untersuchungen an verschiedenen *Gammarus*-Arten. *Arch.Hydrobiol.*, 52: 367-387.
- PONYI, J.E., 1957: Untersuchungen über die Crustaceen der Wasserpflanzbestände im Plattensee. *Arch.Hydrobiol.*, 53: 537-551.
- PONYI, J.E., 1962: Zoologische Untersuchung der Röhrichte des Balaton. I. Krebse (Crustacea). *Annal.Biol.Tihany*, 29: 129-163.
- PONYI, J.E., J.OLAH, P.BIRO, K.BIRO, 1971: Comparative investigations on the benthic fauna at two sewage inflows of Lake Balaton. *Annal.Biol.Tihany*, 38: 199-226.
- SEBESTYEN, O., 1934: A vandorkagylo (*Dreissensia polymorpha* Pall.) és a szövőbolharak (*Corophium curvispinum* G.O.S. f.devium Wundsch) megjelenése és rohamos terjedése a Balatonban. *MBKM*, 7: 190-204.

Table 1.
The number of eggs per female of the different amphipod species.
Symbols as in Figs. 1 and 2.

Stations and dates of collections	C.c.	D.h.	D.v.
1983			
1-M	7.1	17.0	14.7
2-P	8.8	16.4	15.0
3-M	5.5	-	-

4-S	6.4	-	-
5-S	3.3	-	-
6-S	4.7	-	-
1985			
1-M	5.2	22.8	-
2-P	7.1	18.4	17.5
2-M	5.0	-	-
3-M	5.9	-	8
3-P	5.3	-	16.7

Table 2.
The biomass data of different amphipod species in mg animal dry weight/g water plant wet weight
(stations 1-3) and mg animal dry weight/dm² stone surface (stations 4-6).
Symbols as in Figs. 1 and 2.

Stations and dates of collections	C.c.	D.h.	D.v.
1983			
1-M	0.75	0.3	0.2
2-P	1.8	0.2	0.05
3-M	1.3	0.9	0.01

4-S	7.8	0.5	0.1
5-S	1.4	1.7	0.4
6-S	1.7	0.3	0.1
1985			
1-M	2.2	1.2	0.01
2-P	1.0	0.2	0.5
2-M	0.04	0.01	-
3-M	7.3	0.3	0.2
3-P	3.1	0.2	1.3

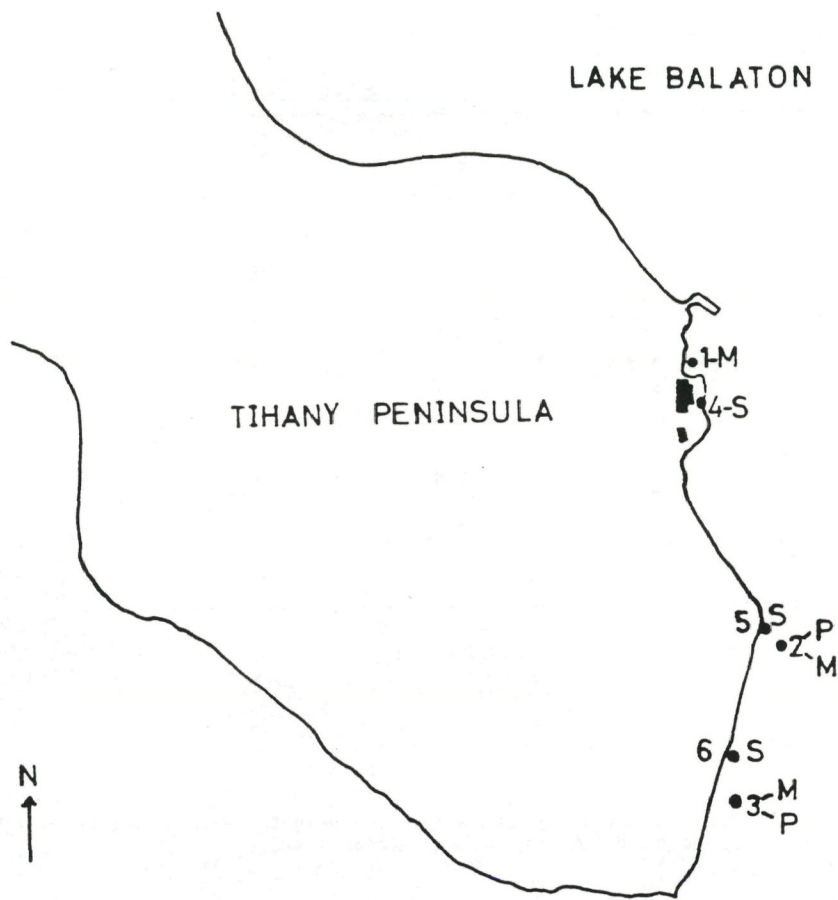


Fig. 1

The stations of collection around Tihany Peninsula.

- 1.) Kis-öböl bay near the Balaton Limnological Research Institute of the Hungarian Academy of Sciences about five metres from the shore on *Myriophyllum spicatum* (M).
- 2.) In front of the fishery base about 50 metres from the shore on *Potamogeton perfoliatus* (P) in 1983 and both on *Potamogeton* and *Myriophyllum* in 1985.
- 3.) Near waterworks beside the sewage inlet on *Myriophyllum* in 1983 and *Myriophyllum* and *Potamogeton* in 1985.
- 4.) Stony littoral zone (S) in front of our Institute.
- 5.) A stony littoral section near station 2.6. Similar stony shore near station 3.

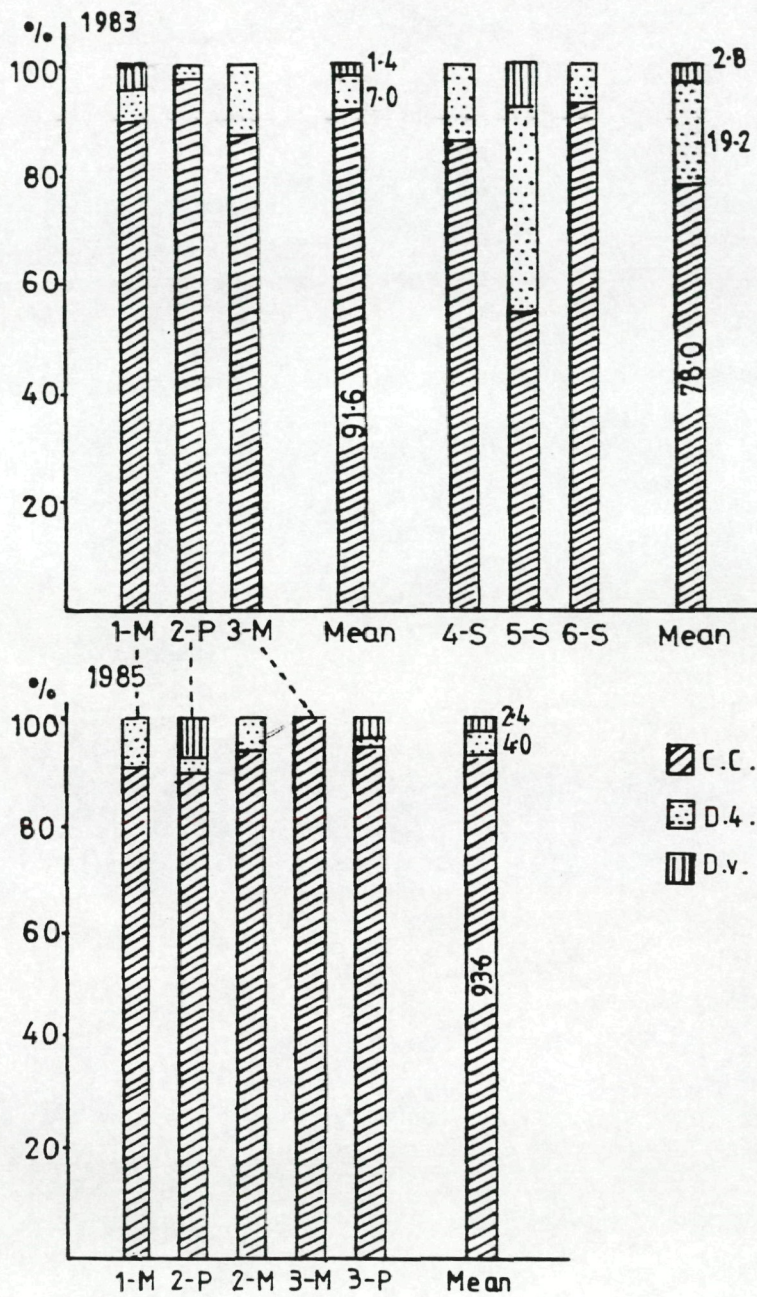


Fig. 2
 Percentage distribution of the three Amphipoda species at the different stations of collections in 1983 and 1985. C.c. = *Corophium curvispinum*, D.h.=*Dikerogammarus haemobaphes*, D.v. = *Dikerogammarus villosus*

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