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AMPHIPODS (GAMMARIDAE AND COROPHIIDAE) FROM IRON GATES I AND II DAMLAKES – DANUBE (ROMANIA), CONCERNING ESPECIALLY 2002 SITUATION

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Abstract. This paper presents data on the spreading, frequency, numerical density and the diversity of the gammarid and corophiid taxa which are present in the structure of the benthic and phytophilous zoocenoses from the Iron Gates I and II damlakes, in 2002. References are made to the evolution in time of the respective amphipods of the zone. On the other side we present the space and season variations of the numerical density and biomass of the gammarid and corophiid total which took place within both ecosystems, in 2002.

Résumé. On présente des données sur la distribution, la fréquence, la densité numérique et la diversité des taxa des gammarides et des corophiides qui sont présents dans la structure des zoocenoses benthiques et phytophiles des lacs d'accumulation Porțile de Fier I et II, en 2002. On fait aussi des références sur l'évolution en temps des amphipodes du secteur. De l'autre côté ils sont présentes les variations dans l'espace et saisonnieres de la densité numérique et de la biomasse du total des gammarides et corophiides dans les deux écosystèmes, en 2002.

Key words: Amphipoda, faunistic, ecology, the Danube, Romania.

The study of the amphipods of the Danube is one of our old constant activity. Some data from literature as well as the personal ones were the subject of a scientifical paper on the populations of gammarids and corophiids along the Romanian sector of the river (Popescu-Marinescu & col., 2001). We mainly pointed out the changings occurred at the level of taxa of these crustaceans, from 1942 to 1996.

In 2002, the senior author of this paper studied thoroughly the amphipods, having the opportunity of collecting materials and analysing the benthic fauna from the two damlakes of the Romanian Danube (Popescu-Marinescu, 2004; 2005) within a contract with „The Branch of <Iron Gates> Hydro-Electric Power Stations".

We payed much attention to these organisms because, on the one side in the Danube only Ponto-Caspian elements occur, and on the other one, individuals of these taxa occur on submerged plants, although most of them live in benthos. We have to point out that the Iron Gates zone is a kind of barrier for most of the Ponto-Caspian organisms from the river, only some of them being able to get over this threshold, among them being some gammarids and corophiids.

MATERIAL AND METHOD

The material, representing the subject of this paper, originates in Iron Gates I and II damlakes, collected in the summer and autumn of 2002. This was a special year from the hydrological point of view, the floodings continuing towards summer-autumn.

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Collectings of the samples for the study of the benthic fauna were made by quantitative methods, using a Bodengreiffer with a surface of 400 cm^2, on a muddy, sandy, stony or mosaic substratum. Simultaneously with the material we sampled vegetation for the study of the phytophilous organisms. In this case the samples were qualitative, consisting of about 500 g from a mixture of submerged macrophytes, grown towards the lake shore. The material was fixed in formol.

After they were sorted and counted, the animals were put in 70° alcohol. The results were reported for a square meter of benthic surface or for 500 g macrophytes. The identification of the amphipods was made by both authors of the paper.

On the spot, specific observations and measurements were made on the characteristics of the facies, the water depth, water pH, water temperature, etc. The names of the profiles and the stations are included in each table. In addition, in the tables 5 and 7, where all stations are mentioned, we also wrote the rkm of the Danube where each profile was placed.

RESULTS AND DISCUSSIONS

Having at our disposal a rich and well prepared material, we can allow ourselves to analyse the amphipods from several points of view, amphipods which were present in the structure of the benthic and phytophilous zoocenoses, from both Iron Gates damlakes, in 2002.

We remind you that the sudden changings of the environmental elements, generated by the construction of the damlakes from the Romanian Danube, subsequently followed by others, but with a slow construction rhythm, influenced also the biology of the aquatic organisms, including the amphipods. As a result, in 2002, there were some characteristic aspects of gammarid and corophiid evolution.

A. The distribution, numerical density, frequency and diversity of the gammarid taxa, identified in the benthic and phytophilous zoocenoses of the Iron Gates I and II damlakes

a. The distribution, numerical density, and frequncy of the gammarids from the benthic zoocenoses (Tabs 1, 2)

Analysing table 1, it can be observed that *Obesogammarus obesus* was the most spread species in the Iron Gate I damlake, in 2002, whose zone extended almost along the whole lake, and also in transversal. Being the most spread species among gammarids it also had the greatest frequency within the family (Tab. 2). From the numerical density point of view, *O. obesus* reached a maximum of 68,425 individuals/m^2 in 2002. It reached this figure because the geo-morphological conditions permitted it, and also because of the prevalence of the muddy, sandy , sometimes stony facies.

A remark valid to all gammarid taxa of the zone regards the presence of the monospecific populations in rare cases.

In 2002, *O. obesus* reached a maximum development, gaining gradually a more important place than the other representatives of the same family. Between 1942–1943 (Băcesco, 1948), then between 1958-1968 (Popescu-Marinescu, 1970), the species was cited as a present element within the zone of the future damlake. After two years since the lake was created, in 1972, it was in the third place among gammarids, within a large distribution along the new created ecosystem (Cure & col., 1975). In 1986, it became prevalent within its group, at Mraconia (566

Table 1

Spreading and numerical density of the Gammaridae taxa from benthic fauna in the Iron Gates I and II damlakes, in 2002.

Taxon names	Numerical density ind/m^2	% from total Gamma-ridae	Profiles*-Stations**	Date
1	2	3	4	5
			DAMLAKE IRON GATES I	
Chaetogammarus tenellus behningi	56	14.00	Baziaş – L.r.	6.VI
Chaetogammarus tenellus behningi	570	76.00	Baziaş – L.r.	10.IX
Chaetogammarus tenellus behningi	2,078	62.03	Baziaş – I.z.	10.IX
Chaetogammarus tenellus behningi	51	4.00	Moldova V. – M.n.z.	6.VI
Chaetogammarus tenellus behningi	1,355	34.00	Moldova V. I.z.	11.IX
Chaetogammarus tenellus behningi	9	5.55	Sirina – L.r	6.VI
Chaetogammarus tenellus behningi	131	4.00	Greben – L.r.	7.VI
Chaetogammarus tenellus behningi	38	100.00	Greben – M.n.z.	12.IX
Chaetogammarus tenellus behningi	532	30.00	Mraconia – M.n.z.	13.IX
Chaetogammarus tenellus behningi	150	100.00	Cerna – Gulf tail	13.IX
Dikerogammarus haemobaphes fluviatilis	28	7.00	Baziaş – L.r.	6.VI
Dikerogammarus haemobaphes fluviatilis	8,447	10.00	Baziaş – I.z.	6.VI
Dikerogammarus haemobaphes fluviatilis	893	9.40	Baziaş – M.n.z.	6.VI
Dikerogammarus haemobaphes fluviatilis	51	4.00	Moldova V. – M.n.z.	6.VI
Dikerogammarus haemobaphes fluviatilis	37	22.22	Sirina – I.z.	6.VI
Dikerogammarus haemobaphes fluviatilis	57	13.34	Elişeva – M.n.z.	7.VI
Dikerogammarus haemobaphes fluviatilis	292	9.00	Greben – L.r.	7.VI
Dikerogammarus haemobaphes fluviatilis	50	100.00	Greben – M.n.z.	7.VI
Dikerogammarus haemobaphes fluviatilis	160	9.00	Mraconia – M.n.z.	13.IX
Dikerogammarus villosus	627	6.60	Baziaş – M.n.z.	6.VI
Dikerogammarus villosus	217	6.48	Baziaş – I.z.	10.IX
Dikerogammarus villosus	1,650	14.67	Ostrov – M.n.z.	6.VI
Dikerogammarus villosus	736	31.00	Ostrov – M.n.z.	11.IX
Dikerogammarus villosus	359	9.00	Moldova V. – I.z.	11.IX
Dikerogammarus villosus	227	53.34	Elişeva – M.n.z.	7.VI
Dikerogammarus villosus bispinosus	28	7.00	Baziaş – L.r.	6.VI
Dikerogammarus villosus bispinosus	7,603	9.00	Baziaş – I.z.	6.VI
Dikerogammarus villosus bispinosus	1,330	14.00	Baziaş – M.n.z.	6.VI
Dikerogammarus villosus bispinosus	60	8.00	Baziaş – L.r.	10.IX
Dikerogammarus villosus bispinosus	210	42.00	Baziaş – M.n.z	10.IX
Dikerogammarus villosus bispinosus	2,050	18.22	Ostrov – M.n.z.	6.VI
Dikerogammarus villosus bispinosus	570	24.00	Ostrov – M.n.z.	11.IX
Dikerogammarus villosus bispinosus	51	4.00	Moldova V. – M.n.z.	6.VI
Dikerogammarus villosus bispinosus	1,474	37.00	Moldova V. – I.z.	11.IX
Dikerogammarus villosus bispinosus	19	11.11	Sirina – I.z.	6.VI
Dikerogammarus villosus bispinosus	113	26.26	Elişeva – M.n.z.	7.VI
Dikerogammarus villosus bispinosus	13	100.00	Elişeva – M.n.z.	12.IX
Dikerogammarus villosus bispinosus	292	9.00	Greben – L.r.	7.VI
Dikerogammarus villosus bispinosus	25	50.00	Mracovia – M.n.z.	7.VI
Dikerogammarus villosus bispinosus	320	18.00	Mraconia – M.n.z.	13.IX

Table 1 (continued)

1	2	3	4	5
Obesogammarus obesus	232	58.00	Baziaş – L.r.	6.VI
Obesogammarus obesus	68,425	81.00	Baziaş – I.z.	6.VI
Obesogammarus obesus	6,650	70.00	Baziaş – M.n.z.	6.VI
Obesogammarus obesus	372	11.11	Baziaş – I.z.	10.IX
Obesogammarus obesus	120	16.00	Baziaş – L.r.	10.IX
Obesogammarus obesus	290	58.00	Baziaş – M.n.z.	10.IX
Obesogammarus obesus	4,800	42.67	Ostrov – M.n.z.	6.VI
Obesogammarus obesus	1,079	45.00	Ostrov – M.n.z.	11.IX
Obesogammarus obesus	1,122	88.00	Moldova V. – M.n.z.	6.VI
Obesogammarus obesus	797	20.00	Moldova V. – I.z.	11.IX
Obesogammarus obesus	2,875	100.00	Moldova V. – M.n.z.	11.IX
Obesogammarus obesus	102	61.12	Sirina – I.z.	6.VI
Obesogammarus obesus	175	100.00	Sirina – I.z.	10.IX
Obesogammarus obesus	892	83.00	Elişeva – I.z.	12.IX
Obesogammarus obesus	2,535	78.00	Greben – L.r.	7.VI
Obesogammarus obesus	400	100.00	Sviniţa – M.n.z.	7.VI
Obesogammarus obesus	25	50.00	Mraconia – M.n.z.	7.VI
Obesogammarus obesus	763	43.00	Mraconia – M.n.z.	13.IX
Pontogammarus sarsi	56	14.00	Baziaş – L.r.	6.VI
Pontogammarus sarsi	683	20.37	Baziaş – I.z.	10.IX
Pontogammarus sarsi	2,750	24.44	Ostrov – M.n.z.	6.VI
Pontogammarus sarsi	75	100.00	Elişeva – I.z.	7.VI
Pontogammarus sarsi	28	6.66	Elişeva – M.n.z.	7.VI
Pontogammarus sarsi	183	17.00	Elişeva – I.z.	12.IX

DAMLAKE IRON GATES II

Chaetogammarus tenellus behningi	30	20.00	Ostrovu C. – L.r.	9.VI
Chaetogammarus tenellus behningi	155	95.00	Ostrovu C. – M.n.z.	9.VI
Chaetogammarus tenellus behningi	3,539	99.00	Ostrovu C. – M.n.z.	15.IX
Chaetogammarus tenellus behningi	145	83.00	Crivina – M.n.z.	10.VI
Chaetogammarus tenellus behningi	47	15.00	Ţigănaş – L.r.	10.VI
Chaetogammarus tenellus behningi	30	8.00	Ţigănaş – M.n.z.	10.VI
Chaetogammarus tenellus behningi	125	100.00	Ţigănaş – L.r.	16.IX
Chaetogammarus tenellus behningi	850	100.00	Ostrovul M. – M.n.z.	11.VI
Dikerogammarus haemobaphes fluviatilis	488	75.00	Topolniţa – M.n.z.	8.VI
Dikerogammarus haemobaphes fluviatilis	30	20.00	Ostrovu C. – L.r.	9.VI
Dikerogammarus haemobaphes fluviatilis	3	3.00	Ostrovu C. – M.n.z.	9.VI
Dikerogammarus haemobaphes fluviatilis	172	55.00	Ţigănaş – L.r.	10.VI
Dikerogammarus haemobaphes fluviatilis	345	92.00	Ţigănaş – M.n.z.	10.VI
Dikerogammarus haemobaphes fluviatilis	250	100.00	Ţigănaş – M.n.z.	16.IX
Dikerogammarus haemobaphes fluviatilis	75	100.00	Ostrovul M. – M.n.z.	17.IX
Dikerogammarus villosus	1	1.00	Ostrovu C. – M.n.z.	9.VI
Dikerogammarus villosus bispinosus	1	1.00	Ostrovu C. – M.n.z.	9.VI
Dikerogammarus villosus bispinosus	36	1.00	Ostrovu C. – M.n.z.	15.IX
Dikerogammarus villosus bispinosus	30	17.00	Crivina – M.n.z.	10.VI
Obesogammarus obesus	162	25.00	Topolniţa – M.n.z.	8.VI
Obesogammarus obesus	60	40.00	Ostrovu C. – L.r.	9.VI
Obesogammarus obesus	94	30.00	Ţigănaş – L.r.	10.VI
Pontogammarus sarsi	30	20.00	Ostrovu C. L.r.	9.VI

* Profiles: Moldova V.= Moldova Veche; Ostrovu C.= Ostrovu Corbului; Ostrovul M. = Ostrovul Mare
**Stations: L.r. = Left riparian; I.z. = Intermediary zone; M.n.z. = Middle navigable zone.

Table 2

Frequency of the Amphipoda taxa in the benthic fauna from the Iron Gates I and II damlakes, in 2002.

Taxon names	Damlake	Frequency %
Chaetogammarus tenellus behningi	Iron Gates I	20.83
Dikerogammarus haemobaphes fluviatilis	Iron Gates I	18.75
Dikerogammarus villosus	Iron Gates I	12.50
Dikerogammarus villosus bispinosus	Iron Gates I	31.25
Obesogammarus obesus	Iron Gates I	37.50
Pontogammarus sarsi	Iron Gates I	12.50
Corophium chelicorne	Iron Gates I	16.66
Corophium curvispinum	Iron Gates I	25.00
Corophium robustum	Iron Gates I	4.17
Chaetogammarus tenellus behningi	Iron Gates II	36.36
Dikerogammarus haemobaphes fluviatilis	Iron Gates II	31.82
Dikerogammarus villosus	Iron Gates II	4.55
Dikerogammarus villosus bispinosus	Iron Gates II	13.64
Obesogammarus obesus	Iron Gates II	13.64
Pontogammarus sarsi	Iron Gates II	4.55
Corophium curvispinum	Iron Gates II	36.36

individuals/m^2) (Popescu-Marinescu & Diaconu, 1989). The number of the individuals of *O. obesus* populations increased continuously in some zones that, in 1995, at Moldova Veche (within the conditions of an explosive development of gamarids) it covered an important part of the 284,950 individuals/m^2, being in the second place among the four present taxa.

Dikerogammarus villosus bispinosus was the subprevalent taxon in Iron Gates I damlake, in 2002, being occurred within the same distribution zone as the previous species, but with a smaller frequency; it was occurred mostly in summer than in autumn. It was present on the same facies as *Obesogammarus obesus*. The maximum of numerical density of the subspecies reached 7,602 individuals/m^2.

As a matter of fact, along the time, even before the construction of the Iron Gates I damlake, *D. v. bispinosus* did not suffer great fluctuations from its position point of view within Gammaridae. So, between 1958-1968, in the river sector between rkms 1,042 - 943, it was on the third place (Popescu-Marinescu, 1970). In 1972, it had the greatest numerical density and frequency, between rkms 1,018 – 960, together with *D. villosus* (Cure & col., 1975). In 1995 it was the third among the gammarids of the lake (Popescu-Marinescu & col., 2001). Pay attention, 1995 is the year of the maximum development of the numerical density of the gammarids along the history of this aquatic basin.

In 2002, *Chaetogammarus tenellus behningi* had the largest distribution zone in the benthic fauna, along the Iron Gates I damlake. In transversal profile it developed better in the zone between the riparian and middle navigable zone, where it reached the maximum of numerical density, with 2,078 individuals/m^2. In our opinion, its distribution, particularly in the upper side of the lake, is due to the dominance of the muddy-sandy or sandy-muddy facies of the zone, although Cărăușu & col. (1955) asserted that this subspecies did not depend on the facies structure. In spite of the fact that it was present along the whole lake, *Ch. t. behningi* was on the third place as frequency and on the fourth one as maximum of numerical density. The largest populations occurred in autumn.

We consider a regress the situation of 2002 for this taxon in the Iron Gates I damlake, in comparison with what existed before the dam construction, when it was prevalent. In this respect, *Ch. t. behningi* was the most important gammarid at Dubova, in 1943, as well as within the period 1958-1968, in the sector between rkms 1,042 - 943. On the other side, there is a progress in comparison with 1972, when it had a restricted distribution, being present only at Bahna (Popescu-Marinescu & col., 2001).

In 2002, *Dikerogammarus haemobaphes fluviatilis* reached the maximum of 8,447 individuals/m^2 and a slightly lower frequency than that of *Chaetogammarus tenellus behningi*. But we have to take into consideration that *Dikerogammarus haemobaphes fluviatilis* was present in the lake almost exclusively in summer. We can explain this phenomenon partially due to the extended high floods which washed and drifted a large part of the mobile substratum.

The development of *D. h. fluviatilis* was sinuous in the course of time. In 1942 it had an important place within the abundant fauna of the stony facies from Kralina; in 1943 it was present only in the rich zoocenosis prevailed by corophiids, from Dubova (Băcesco, 1948). In 1972 the population of this taxon decreased, being very poor, but in 1981-1982 the numerical density increased a lot, its frequency being of 90% in Mraconia zone (Popescu-Marinescu, 1986; 1987 a). In 1986, in the same station it was prevalent, with a frequency of 100% (Popescu-Marinescu & Diaconu, 1989). After a 10 years period (1995-1996) the populations of *D. h. fluviatilis* decreased again, being just present, according to Popescu-Marinescu & col.'s (2001) team. But in 2002, a good recovering of it was remaked.

In 2002, *Pontogammarus sarsi* and *Dikerogammarus villosus* were the weakest represented species in the Iron Gates I damlake, with a distribution only in the upper sector and mainly in the intermediary and middle navigable zones.

Pontogammarus sarsi, which in 1995-1996 was prevalent, in 2002 had a restricted distribution zone and a low frequency besides a maximum density of 2,750 individuals/m^2.

Dikerogammarus villosus, with the same low frequency as the previous species in 2002, reached the maximum numerical density of only 1,650 individuals/m^2, its distribution zone being restricted.

In 2002, in Iron Gates II damlake, we remarked significant changings in comparison with the first damlake at the level of the gammarids from the benthic zoocenoses. It is important to underline that if the benthic zoocenoses from the Iron Gates I damlake were well studied, both before and after the river was dammed, we cannot assert the same thing for the Iron Gates II damlake. So that we have a few reference data for the second lake.

Chaetogammarus tenellus behningi, which was prevalent among the gammarids of the ecosystem in 2002, had a distribution only along 2/3 of the Iron Gates II damlake, yet being on the first place regading the frequency. Maximum of numerical density reached 3,539 individuals/m^2, on a stony facies. It is interestring that both the minimum and the maximum density was recorded in the samples collected from the middle navigable zone, but in different seasons.

The data of 1978 indicate *Ch. t. behningi* as the only gammarid from the rkm 932, on the sandy and sandy-stony facies with blocks.

Dikerogammarus haemobaphes fluviatilis, the subdominant taxon of 2002 in Iron Gates II damlake, and with a smaller frequency than the prevalent taxon, extended its distribution zone, almost covering all the lake. Maximum of numerical development, a modest one, of 488 individuals/m^2, was identified on a facies formed of sand and gravel. As a matter of fact, *D. h. fluviatilis* had a better frequency in summer in the second lake, similar to that from Iron Gates I.

A few previous mentions refer to 1985-1986, when its presence was mentioned in the sector between rkms 931-898, on the lake shore, on a mosaic facies, with a frequency of 33% (Popescu-Marinescu, 1987 b). Than, in 1995-1996, it was recorded at rkm 911 as a subdominant taxon (Popescu-Marinescu & col., 2001).

Dikerogammarus villosus bispinosus, with a more limited distribution zone and reduced values of the numerical density in comparison with the taxa previously described, had also a small frequency. It is interesting that it was present only in the samples taken from the middle navigable zone.

In a closer period to our studies (1995-1996), at rkms 911 and 879, *D. v. bispinosus* was on the third place among the gammarids present in these stations.

Dikerogammarus villosus and *Pontogammarus sarsi* had the weakest presence in Iron Gates II damlake, in 2002, with very small values of the numerical density and a low frequency (as it was recorded in Iron Gates I damlake). Both taxa were found on the Ostrovu Corbului profile, the place where the most varied gammarid fauna of the lake was present. The regress of *P. sarsi* from both damlakes raises questions.

b. The distribution, numerical density of the gammarids from the phytophilous zoocenoses (Tab. 3)

We can assert that the studies on the phytophilous fauna from the Iron Gates zone are very restricted. In the past, different specialists did not approached too much this zone, excepting the chironomids. Some data are published in the monograph on the Iron Gates. Recently, Popescu-Marinescu (2003) published a paper on the invertebrates from the submerged macrophytes from the Iron Gates I and II damlakes, based on the samples from 2002. From that material we have taken over the amphipods.

We have to underline that, in 2002, in both damlakes from the Romanian Danube, the submerged macrophytic vegetation developed towards the shore. That is why all samples were collected from that zone.

Because the gammarids from the phytophilous fauna were not our main subject of our study, the analysed material (Tab. 3) is much poor than that one from the benthic zoocenoses.

Therefore, basing on the data we have at our disposal, we can say that *Dikerogammarus villosus bispinosus* had the distribution zone slightly larger and a greater frequency than *Chaetogammarus tenellus behningi*, in the Iron Gates I. But from the numerical density point of view, the second taxon was on the first place, with a maximum of 149 individuals/m^2 in comparison with 18 individuals/m^2. The weakest representantion among the gammarids from the vegetation had *Obesogammarus obesus*, which was prevalent among the gammarids of the benthic fauna, from the same damlake.

In Iron Gates II damlake, rich in macrophytic vegetation, *Chaetogammarus tenellus behningi* was prevalent within the family, its distribution zone covering almost the entire lake. It has to be mentioned that this taxa was also on the first place

Table 3

Spreading and numerical density of the Gammaridae taxa from phytophilic fauna in the Iron Gates I and II damlakes, in 2002.

Taxon names	Numerical density ind/m^2	% from total Gamma-ridae	Profiles*-Stations**	Date
1	2	3	4	5
			DAMLAKE IRON GATES I	
Chaetogammarus tenellus behningi	6	50.00	Upstream Nera – L.r.	10.IX
Chaetogammarus tenellus behningi	149	65.63	Baziaş – L.r.	10.IX
Dikerogammarus haemobaphes fluviatilis	3	25.00	Upstream Nera – L.r.	10.IX
Dikerogammarus haemobaphes fluviatilis	35	15.42	Baziaş – L.r.	10.IX
Dikerogammarus villosus	15	6.61	Baziaş – L.r.	10.IX
Dikerogammarus villosus bispinosus	3	25.00	Upstream Nera – L.r.	10.IX
Dikerogammarus villosus bispinosus	18	7.93	Baziaş – L.r.	10.IX
Dikerogammarus villosus bispinosus	26	100.00	Dubova – Gulf	5.VI
Obesogammarus obesus	10	4.41	Baziaş – L.r.	10.IX
			DAMLAKE IRON GATES II	
Chaetogammarus tenellus behningi	38	97.00	Rkm 922 – L.r.	15.IX
Chaetogammarus tenellus behningi	49	98.00	Ostrovu C. – L.r.	15.IX
Chaetogammarus tenellus behningi	7	54.00	Ţigănaş – L.r.	16.IX
Chaetogammarus tenellus behningi	2	67.00	Rkm 875 – L.r.	17.IX
Chaetogammarus tenellus behningi	4	100.00	Ostrovul M. – L.r.	17.IX
Dikerogammarus haemobaphes fluviatilis	72	54.00	Ostrovu C. – L.r.	9.VI
Dikerogammarus haemobaphes fluviatilis	1	33.00	Rkm 875 – L.r.	17.IX
Dikerogammarus villosus	14	11.00	Ostrovu C. – L.r.	9.VI
Dikerogammarus villosus bispinosus	1	3.00	Rkm 922 – L.r.	15.IX
Dikerogammarus villosus bispinosus	43	32.00	Ostrovu C. – L.r.	9.VI
Dikerogammarus villosus bispinosus	1	2.00	Ostrovu C. – L.r.	15.IX
Dikerogammarus villosus bispinosus	5	38.00	Ţigănaş – L.r.	16.IX
Obesogammarus obesus	4	3.00	Ostrovu C. – L.r.	9.VI
Obesogammarus obesus	1	8.00	Ţigănaş – L.r.	16.IX

* Profiles: Ostrovu C. = Ostrovu Corbului; Ostrovul M. = Ostrovul Mare.
** Stations: L.r. = Left riparian.

(among gammarids) in the benthic fauna of this ecosystem. With a less restricted distribution zone, *Dikerogammarus villosus bispinosus* is on the second place among the phytophilous gammarids. In the decreasing order of frequency and distribution *D. haemobaphes fluviatilis* is in the first place with a maximum of 72 individuals/m^2. Also, in this ecosystem, *Obesogammarus obesus* and *Dikerogammarus villosus* were in the last places within the family in the fauna of the submerged macrophytic vegetation.

We insist undelining that the data on the numerical density from the table 3 are only informative, the samples being considered qualitative. But they have an indisputable value regarding the percentage of the mentioned taxa among all gammarids from the analysed samples.

c. Taxonomical diversity of the gammarids from the benthic and phytophilous zoocenoses (Tabs 1, 3)

From the materials presented in tables 1 and 3 it results that, in 2002, the gammarids include almost the same taxa (with some exceptions) as before the damming of the river (Popescu-Marinescu, 1970). Meanwhile, at the Iron Gates, some changings at the level of the taxonomical diversity took place, generated by the environmental factors (which we mentioned above).

Precisely, we can assert that the taxonomical diversity of the gammarids in the Iron Gates damlakes, in 2002, is reduced in comparison with what exists at the mouth of the Danube. We considered a guide mark the number of the taxa from the confluence of Sulina and Sf. Gheorghe navigable branches, where there is the largest variety of forms within this family, especially from the benthic zoocenoses (Popescu-Marinescu & col., 2001). All the representatives of the gammarids from the Danube are Ponto-Caspian elements. Within this context, we have to take into consideration the distance of about ± 1,000 rkm from the mouths of the Danube to our station from the two damlakes. We underlined that because the different taxa are not Ponto-Caspian relics along the whole river sector; they are autoimigrants along most of it. So, the farther we are from the mouths of the Danube the lower is their number.

But, punctually, referring to the gammarids from Iron Gates I and II damlakes from 2002, we remarked a large variety of forms within them in Baziaş-Elişeva sector (Iron Gates I damlake) and Ostrovu Corbului zone (Iron Gates II damlake). This remark regards both the taxa identified from the benthic fauna and from the phytophilous one. Making a comparison between the structure of Gammaridae from the two categories of zoocenoses of the two damlakes of the Romanian Danube, it results that the taxonomical diversity of the benthic fauna was larger than that of the submerged macrophytes. On the other side, on the plants from Iron Gates II damlake we found a larger variety of forms than in the damlake I. This situation is normal, according to the development of the vegetation.

B. The distribution, numerical density, frequency and diversity of the corophiid taxa identified from the benthic and phytophilous zoocenoses from the Iron Gates I and II damlakes

a. The distribution, numerical density and frequency of the corophiids from the benthic zoocenoses (Tabs 2, 4)

As we presented for gammarids, also sudden major changings or slow and less important ones took place within corophiids, generated by the changings of the environmental factors.

Table 4

Spreading and numerical density of the *Corophium* species of the benthic fauna in the Iron Gates I and II damlakes, in 2002.

Taxon names	Numerical density ind/m^2	% from total Coro-phiidae	Profiles* – Stations**	Date
1	2	3	4	5
				DAMLAKE IRON GATES I
Corophium chelicorne	100	100.00	Baziaş – I.z.	6.VI
Corophium chelicorne	100	100.00	Baziaş – I.z.	10.IX
Corophium chelicorne	9,900	66.00	Ostrov – M.n.z.	6.VI
Corophium chelicorne	4,750	100.00	Ostrov – M.n.z.	11.IX
Corophium chelicorne	50	100.00	Moldova V. – M.n.z.	6.VI
Corophium chelicorne	775	100.00	Sirina – I.z.	11.IX
Corophium chelicorne	17	17.00	Elişeva – M.n.z.	12.IX
Corophium chelicorne	4,790	67.00	Mraconia – M.n.z.	13.IX
Corophium curvispinum	825	100.00	Baziaş – L.r.	6.VI
Corophium curvispinum	225	100.00	Baziaş – M.n.z.	6.VI
Corophium curvispinum	200	100.00	Baziaş – L.r.	10.VI
Corophium curvispinum	4,325	100.00	Baziaş – I.z.	10.IX
Corophium curvispinum	175	100.00	Baziaş – M.n.z.	10.IX
Corophium curvispinum	5,100	33.00	Ostrov – M.n.z.	6.VI
Corophium curvispinum	41,775	100.00	Moldova V. – I.z.	11.IX
Corophium curvispinum	75	100.00	Moldova V – M.n.z.	11.IX
Corophium curvispinum	142	100.00	Sirina – I.z.	6.VI
Corophium curvispinum	83	83.00	Elişeva – M.n.z.	12.IX
Corophium curvispinum	50	100.00	Greben – M.n.z.	7.VI
Corophium curvispinum	2,360	33.00	Mraconia – M.n.z.	13.IX
Corophium robustum	100	100.00	Elişeva – I.z.	7.VI
Corophium robustum	1,825	100.00	Elişeva – I.z.	12.IX
				DAMLAKE IRON GATES II
Corophium curvispinum	3,250	100.00	Topolniţa – M.n.z.	8.VI
Corophium curvispinum	1,487	100.00	Topolniţa – M.n.z.	14.IX
Corophium curvispinum	75	100.00	Ostrovu C. – L.r.	9.VI
Corophium curvispinum	200	100.00	Ostrovu C. – M.n.z.	9.VI
Corophium curvispinum	725	100.00	Ostrovu C. – M.n.z.	15.IX
Corophium curvispinum	550	100.00	Crivina – M.n.z.	15.IX
Corophium curvispinum	112	100.00	Ţigănaş – I.z.	10.VI
Corophium curvispinum	50	100.00	Ţigănaş – M.n.z.	10.VI

* Profiles : Moldova V. = Moldova Veche; Ostrovu C. = Ostrovu Corbului

**Stations: L.r. = Left riparian; I.z. = Intermediary zone; M.n.z. = Middle navigable zone

In this respect, in 2002, in Iron Gates I damlake, *Corophium curvispinum* was the prevalent species, whose distribution covered almost the whole ecosystem. In spite of this, its frequency was not too high, but the best within the species of the genus, present there. The maximum numerical density, of 41,775 individuals/m^2, occur at Moldova Veche, in autumn, on the sandy facies, in the intermediary zone between the middle navigable zone and the left riparian, where *C. curvispinum* was the single representative of the family in the benthic fauna. But, we have to mention that the figure of 2002 did not match that of 50,633 individuals/m^2, which represent 15.5% of all corophiids from Dubova, in the undammed Danube of 1943 (percentage given by Băcesco, 1948). But, the good enough development of *C. curvispinum* in 1943 continued, so that it was prevalent within the genus during 1958-1968. Then, even after two years since the construction of the first damlake of the Romanian Danube was made, in 1972, this species was the most spread and dense from the three ones present in the zone (Cure & col., 1975; Popescu-Marinescu & col., 2001). Next years, 1981–1982 and 1986, it was also prevalent, but later, in 1995–1996, it gave up the first place, coming back in 2002. It might be possible that this development and distribution of *C. curvispinum* (being although a Ponto-Caspian element) to occur because this species is not sensitive to the oxygen quantity (it needs only 2 mg/l), as Cărăușu & col. (1955) remarked. We think that only due to this phenomenon the high density from these agglomerations of the tubes of the animal from the sandy or stony facies explains, where tens of thousands of individuals, even from different species, live together.

In 2002, *Corophium chelicorne* was on the second place, among the three species of the genus, present in the Iron Gates I damlake. Although its distribution zone covered almost the entire lake, it had a relatively small frequency. The maximum numerical density, of 9,900 individuals/m^2 occurred also in the upper side of the ecosystem, as in the previous taxon.

We have to underline that *C. chelicorne* is one of the amphipods which developed in the Iron Gates after the construction of the first damlake in the zone; it was mentioned at Mraconia, in 1972 (Cure & col, 1975).

Corophium robustum, with a distribution zone limited only to Eliseva, in 2002, the first damlake from the Romanian Danube, had a numerical density of maximum 1,825 individuals/m^2. As we expected, the frequency was low.

The evolution curve of this species, before and after the construction of the Iron Gates I damlake, is sinuous. So that, in 1943, the percentage of 4.4 % from the total of the individuals of the genus *Corophium* (Băcesco, 1948) would represent 15,713 individuals/m^2, both figures indicating it on the third place that year. During 1958-1968, it didn't reach high numbers of individuals, although sometimes it was prevalent in comparison with the other species of the genus. After the Danube was dammed, in 1972, it occurred only at Mraconia, as in the period 1981–1982, when it had a frequency of 20-30% and a high numerical density, in the same station. It became prevalent within *Corophium* in 1995, at Moldova Nouă, exceeding much more the population occurred at Dubova, in 1943 (Popescu-Marinescu & Oaie, 1996).

In 2002, in Iron Gates II damlake, *Corophium curvispinum* proved to be the single species of the genus, its population reaching a maximum of 3,250 individuals/m^2 and a higher frequency than in the Iron Gates I damlake.

As regards the evolution in time of the populations of this taxon within the zone, the data from literature mention that only 20 individuals/m^2 occur at Drobeta-

Turnu Severin, in 1972 (Popescu-Marinescu & Elian Tălău, 1974). After the construction of the Iron Gates II damlake, in 1986, at rkm 898, the 39,525 individuals/m^2 from the stony facies with gravel and sand, in the medial part of the aquatic basin, represent the maximum of numerical density reached by this species (the only representative of the corophiids) in this ecosystem and a frequency of 50%. In 1995, at rkms 911 and 879, it was on the second place within the genus (Popescu-Marinescu & Oaie, 1996).

b. The distribution, numerical density and the frequency of the corophiids from the phytophilous zoocenoses

From the samples of submerged macrophytes from 2002, studied by us for the phytophilous fauna, we identified only *Corophium curvispinum*. Its density from the total elements from the sample always represented a percentage below 10%, in both ecosystems. In the Iron Gates I damlake, it was occurred only in the entrance zone of the river in Romania (from where we had samples). This species had a larger distribution in the Iron Gates II damlake, being present both in the upper side of the basin and in the lower one. These estimations are provided by the little material we had at our disposal.

c. Taxonomical diversity of the corophiids from the benthic and phytophilous zoocenoses.

From the very beginning we remarked that the taxonomical diversity of the corophiids from the benthic zoocenoses from the Iron Gates I is very reduced. Referring to the corophiids from the benthic zoocenoses from the Iron Gates II damlake, as well to those from the submerged macrophytes from both damlakes, the presence of the monospecific populations of *C. curvispinum* says everything on diversity.

Therefore, large fluctuations of the corophiids existed, both in time and space.

C. The variation of the numerical density and of the biomass of the gammarids from the benthic and phytophilous zoocenoses from the Iron Gates I and II damlakes

a. The variation of the numerical density of the gammarids from the benthic zoocenoses (Tab. 5)

In 2002, in the Iron Gates I damlake, the maximum of the numerical density of the gammarids was of 84,475 individuals/m^2, recorded in summer, from the upper zone of the damlake, at Baziaş, in the intermediary zone, populating the mostly muddy-sandy facies, at a depth of 9.50 m. But, this figure represents only 33.93% from the 284,950 individuals/m^2 (the highest, for the gammarids along the history of this place), recorded at Moldova Veche, in 1995, also in summer, on a mosaic facies. In both cases the zoocenoses were rich and varied; but if in 1995 the gammarids represented 28.09% from all benthic zones, in 2002 they represented only 6.19% (from the total of 1,363,975 individuals/m^2) (Popescu-Marinescu, 2004). Towards the middle and lower sector of the lake, the numerical density of the gammarids decreased. It has to be remaked the minimum figure of 13 individuals/m^2, from Elişeva.

So, there were large fluctuations of the number of the gammarids both in time and space.

Generally, in 2002, in most of the stations where the gammarids were present, they had a higher numerical density in summer than in autumn. The cause

Table 5

Variation of the Gammaridae numerical density and biomass of the benthic zoocenoses in the Iron Gates I and II damlakes, in June/September, 2002.

Profiles (rkm Danube) and Stations	Substratum nature	Water depth (m)	Gammaridae			
			ind/m^2	% from total zoobenthos	mg/m^2	% from total zoobenthos
1	2	3	4	5	6	7
DAMLAKE IRON GATE I						
BAZIAȘ (1072.4)						
Left riparian	Muddy, gravel	1.10	400	3.83	120	0.046
	Sandy, muddy	4.00	150	3.53	400	2.830
Intermediary zone	Muddy, sandy	9.50	84,475	6.19	108,240	4.08
	Sandy, muddy	10.54	3,350	6.69	1,962.5	0.35
Middle navigable zone	Sandy, muddy	14.00	9,500	13.37	40,090	2.18
	Sandy	9.90	500	12.61	193.75	0.13
OSTROV (1062)						
Middle navigable zone	Sandy, stony, muddy	8.40	11,250	19.95	40,875	21.858
	Sandy, muddy	9.06	2,375	13.88	17,500	40.998
MOLDOVA VECHE (1048.7)						
Intermediary zone	In June	samples	were	not	collected	-
	Sandy	9.10	3,925	8.41	2,355	21.89
Middle navigable zone	Sandy, stony, muddy	17.40	1,275	7.67	765	5.09
	Sandy, stony, gravel	19.50	2,875	23.37	1,926.25	0.062
SIRINA (1012.3)						
Intermediary zone	Sandy, muddy	11.30	167	37.11	249.9	1.60
	Stony	9.00	175	7.61	112.5	12.82
ELIȘEVA (1007)						
Intermediary zone	Sandy	9.64	75	5.00	130	0.47
	Muddy	12.00	1,075	11.47	322.5	0.12
Middle navigable zone	Muddy	17.00	425	0.46	4,105	4.39
	Stony	17.50	13	3.13	68	2.67
GREBEN (998)						
Left riparian	Stony	3.64	3,250	35.52	290.5	3.65
	Muddy	6.50	-	-	-	-
Middle navigable zone	Sandy	17.00	50	33.34	125	59.52
	Sandy, stony	18.30	38	43.18	58.88	0.45
SVINIȚA (995)						
Middle navigable zone	Muddy, sandy	14.00	400	0.38	1,100.00	1.79
	Muddy	13.15	-	-	-	-

Table 5 (continued)

1	2	3	4	5	6	7
MRACONIA (967) Middle navigable zone	Muddy Stony, sandy	12.24 20.00	50 1,175	0.31 10.26	78.50 13,775	0.24 7.23
CERNA (954) Gulf tail	- Muddy, sandy	8.00 4.20	- 150	- 0.27	- 87.5	- 0.37
DAMLAKE IRON GATE II						
TOPOLNIȚA (928) Middle navigable zone	Sandy, gravel Stony	13.00 12.00	650 -	1.40 -	975 -	0.058 -
OSTROVU CORBULUI (911) Left riparian	Muddy, stony Muddy	1.45 3.50	150 -	0.95 -	105 -	0.390 -
Middle navigable zone	Stony, gravel, sandy Stony	9.80 15.46	163 3,575	3.85 33.42	1,043.13 5,000	1.88 29.52
CRIVINA (894) Middle navigable zone	Muddy, sandy Sandy, gravel	13.00 13.00	175 -	0.53 -	2,625 -	0.56 -
ȚIGĂNAȘ (878) Intermediary zone	Sandy, stony Sandy, muddy	8.30 8.00	313 125	1.15 1.35	360 37.5	0.17 0.01
Middle navigable zone	Stony, sandy, muddy Sandy, muddy	18.00 18.00	375 250	1.38 1.52	1,125 1,000	0.057 6.890
OSTROVUL MARE (866) Middle navigable zone	Sandy Sandy	15.80 14.75	850 75	0.91 0.39	1,346 225	0.31 3.13

(mentioned before) was mostly due to the strong floods, the organisms living especially on the mobile facies, subjected to the strong drift from that year.

In the Iron Gates II damlake, the values of the numerical density of the members of this family did not varied too much, as in the first damlake. Generally, the fluctuations took place within the limits of hundreds of individuals/m^2. The only different figures were those that represented the maximum of 3,575 individuals/m^2 in the middle navigable zone of the first half of the lake and minimum of 75 individuals/m^2, also in the middle navigable zone, but in the downstream side. Also, in the Iron Gates II damlake, all the other values of the numerical density of the gammarids, excepting the maximum value, were higher in summer than in autumn.

b. The variation of the biomass of the gammarids from benthic zoocenoses (Tab. 5)

It is good to know that the value of the total biomass of a group of organisms depend not only on the weight of each individual but also on their number. Within this context, in the Iron Gates I damlake, the highest value of the biomass of the gammarids was recorded from the upper zone of this aquatic basin, at Baziaş, with 108,240 mg/m^2, representing 4.08% from all invertebrates of the zoocenosis. (Popescu-Marinescu, manuscript). Also, in Baziaş, 40,090 mg/m^2 were found, corresponding to only 9,500 individuals/m^2, the biomass being also bound to the growth and developement of the individuals. Regarding the share of the gammarid biomass within the total weight of the zoobenthic organisms we remarked that, in Greben, in the middle navigable zone, 125 mg/m^2 represented 59.52% of all invertebrates, while 58.88 mg/m^2 represented only 0.45% (up to 100%, there were the mollusks). Therefore the taxonomical structure of the zoocenosis is so important.

In the Iron Gates II damlake, the values of the gammarid biomass were much more modest. The maximum of 5,000 mg/m^2 from Ostrovu Corbului, from the middle navigable zone, represented 29.52% from the total of the biomass of 16,937 mg/m^2 (Popescu-Marinescu, 2005), corresponding to the maximum of numerical density of the gammarids from this damlake. But both in the upper zone of the damlake, close biomasses had a different share from the whole zoocenosis. So, 1,125 mg/m^2 represented only 0.057, while 1,000 mg/m^2 corresponded to 6.89%.

We point out that, in the two damlakes from the Iron Gates, the gammarids form a very good trophic basis for the benthic fishes. But, we ask ourselves what do these high values of benthic biomass found by us represent? Is there a rich trophic base or an absence of the consumers in these damlakes?

c. The variation of the numerical density of the gammarids from the phytophilous zoocenoses (Tab. 6)

Table 6

Numerical density of the Gammaridae and Corophiidae from phytophilous fauna on the Iron Gates I and II damlakes, in 2002.

Gammaridae		Corophiidae			
ind/smp	% from total phytophilous fauna	ind/smp	% from total phytophilous fauna	Profiles – Stations*	Date
DAMLAKE IRON GATES I					
12	7.10	14	8.28	Upstream Nera – L.r.	10.IX
227	79.93	17	5.99	Baziaş – L.r.	10.IX
26	52.00	-	-	Dubova - Gulf	5.VI
DAMLAKE IRON GATES II					
39	4.05	8	1.01	Rkm 922 – L.r.	15.IX
657	24.65	2	0.08	Ostrovu C. – L.r.	9.VI
87	7.54	9	0.78	Ostrovu C. – L.r.	15.IX
18	8.49	-	-	Ţigănaş – L.r.	16.VI
2	0.59	-	-	Rkm 875 – L.r.	17.IX
4	1.71	2	0.85	Ostrovul M. - L.r.	17.IX

*Stations : L.r. = Left riparian

Because the vegetation samples – that mixture of submerged macrophytes – are qualitative, the figures representing the numerical density of the gammarids are orientative. A mixture of submerged plants was collected because we support the idea that different phytophilous invertebrates are not specific to a certain plant or another. The number of the individuals from the biocenosis which populate a certain species of aquatic macrophytes is in interdependence with the bladed surface offered by the plant.

Under these circumstances, we can assert that in 2002, in the Iron Gates I damlake, the maximum of numerical density of 227 individuals/smp. of phytophilous gammarids (79.93% from the total of organisms) from Baziaş, was much more lower than that from Ostrovu Corbului, 657 individuals/smp. (only 24.65% of the total) from the Iron Gates II damlake.

We are disposed to think that we deal with the absence of the consumers in the case of the fauna from the submerged macrophytes.

D. The variation of the numerical density and of the biomass of the corophiids from the benthic and phytophilous zoocenoses from the Iron Gates I and II damlakes

a. The variation of the numerical density of the corophiids from the benthic zoocenoses (Tab. 7)

In 2002, in the Iron Gates I damlake, the numerical density of the corophiids presented large fluctuations from the spatial and seasonal point of view. There is a multitude of causes. The highest values occur as in the gammarids, in the upper side of the lake. By their maximum of 41,775 individuals/m^2 from Moldova Veche, in autumn (from a sandy facies, at a depth of 9.10 m), the corophiids had a share of 89.55% from the total of benthic organisms of 46,650 individuals/m^2 (Popescu-Marinescu, 2004). In the same profile we occur one of the two minimum values of the numerical density of 50 individuals/m^2 (0.30%) corophiids, in summer.

A backward perspective shows us that the 349,187 individuals/m^2 (63.49% from the total of organisms) from Dubova, in 1942 (Băcesco, 1948), represent the maximum reached by the corophiids, as yet, in the Danube from the Iron Gates.

The decresing of number of the individuals of this family, in some zones of the Iron Gates I damlake, is tied fast by the significant diminishing, or even the disappearance, of the stony substratum.

Also in 2002, in the Iron Gates II damlake, the figure of the numerical density of the corophiid was much lower than in the first lake (as well than the total of the numerical density of the zoobenthic organisms). But, we identified the maximum value also from the upper zone of the lake, the 3,250 individuals/m^2 (7.03%) being recorded at Topolniţa, in summer, on a mosaic facies (sand, gravel, stone). The highest percentage of the corophiids within zoocenosis reached 24.09% (corresponding to 1,487 individuals/m^2), also at Topolniţa, but in autumn, on a stony facies. The minimum of numerical density of the representatives of this family was recorded in the lower zone of the damlake, at Ţigănaş, with 50% individuals/m^2 (0.18%), in summer, on a mosaic facies.

Also, in previous years, in the Iron Gates II damlake, the corophiids from the benthic zoocenoses were much better represented (Popescu-Marinescu, 1987 b).

Table 7

Variation of the Corophiidae numerical density and biomass of benthic zoocenosis in the Iron Gates I and II damlakes, in June/September, 2002.

Profiles (rkm Danube) and Stations	Substratum nature	Water depth (m)	ind/m^2	% from total zoobenthos	mg/m^2	% from total zoobenthos
1	2	3	4	5	6	7
						DAMLAKE IRON GATE I
BAZIAȘ						
(1072.4)	Muddy, gravel	1.10	825	7.89	165.00	0.063
Left riparian	Sandy, muddy	4.00	200	4.72	260.00	1.840
Intermediary	Muddy,sandy	9.50	100	0.007	115.00	0.004
zone	Sandy, muddy	10.54	4,325	8.640	3,892.5	0.697
Middle	Sandy, muddy	14.00	225	0.32	90.00	0.005
navigable	Sandy	9.90	175	4.41	22.7	0.015
zone						
OSTROV						
(1062)						
Middle	Sandy, stony, muddy	8.40	15,000	26.60	23,000	12.298
navigable	Sandy, muddy	9.06	4,750	27.77	950	2.226
zone						
MOLDOVA						
VECHE						
(1048.7)						
Intermediary	In	June	samples	were	not	collected
zone	Sandy	9.10	41,775	89.55	8,355	77.66
Middle						
navigable	Sandy, stony, muddy	17.40	50	0.30	17.5	0.120
zone	Sandy, stony, gravel	19.50	75	0.61	100	0.003
SIRINA						
(1012,3)						
Intermediary	Sandy, muddy	11.30	142	31.55	210	1.35
zone	Stony	9.00	775	33.69	155	17.66
ELISEVA						
(1007)						
Intermediary	Sandy	9.64	100	6.67	100	0.36
zone	Muddy	12.00	1,825	19.47	273.75	0.10
Middle						
navigable	Muddy	17.00	-	-	-	-
zone	Stony	17.50	100	24.09	212.5	8.34
GREBEN						
(998)						
Middle	Sandy	17.00	50	33.34	30	14.39
navigable	Sandy, stony	18.30	-	-	-	-
zone						
MRACONIA						
(967)						
Middle	Muddy	12.40	-	-	-	-
navigable	Stony, sandy	20.00	7,150	41.33	5,557.5	2.92
zone						

Table 7 (continued)

1	2	3	4	5	6	7
						DAMLAKE IRON GATE II
TOPOLNIȚA (928) Middle navigable zone	Sandy, gravel stony	13.00	3,250	7.03	1,550	0.09
	Stony	12.00	1,487	24.09	892.50	12.76
OSTROVU CORBULUI (911) Left riparian	Muddy, stony	1.45	75	0.48	33.00	0.123
	Muddy	3.50	-	-	-	-
Middle navigable zone	Stony, gravel, sandy	9.80	200	4.72	68.75	0.12
	Stony	15.46	725	6.78	210	1.24
CRIVINA (894) Middle navigable zone	Muddy, sandy	13.00	-	-	-	-
	Sandy, gravel	13.00	550	4.37	825.00	0.17
ȚIGĂNAȘ (878) Intermediary zone	Sandy, stony	8.30	113	2.92	33.75	0.016
	Sandy, muddy	8.00	-	-	-	-
Middle navigable zone	Stony, sandy, muddy	18.00	50	0.18	35.00	0.002
	Sandy, muddy	18.00	-	-	-	-

b. The variation of the corophiid biomass from the benthic zoocenoses (Tab. 7)

As regards the corophiid biomass from the Iron Gates I damlake in 2002, the discrepancy between the maximum value and the minimum one was diminished, in comparison with what have happened with the numerical density. The maximum of 23,000 mg/m^2, at Ostrov, i.e. 12.298%, did not represented also the highest percentage from the total of the organisms of the zoocenosis. Maximum of 77.66% corresponded to 8,355 individuals/m^2, at Moldova Veche. Minimum biomass reached only 17.5 mg/m^2 (0.12%).

Meanwhile, the corophiid biomass has suffered large variations (Popescu-Marinescu, 1987 a; Popescu-Marinescu & Diaconu, 1989).

In 2002, in the Iron Gates II damlake, the modest values of the corophiid biomass were much lower than those from the first damlake, in the same year. The maximum of 1,550 mg/m^2 in summer, recorded in the upper side of the basin, at Topolnița, corresponded to the highest numerical density of that year; the percentage of 0.09% of the total of the zoobenthic organisms is very low. And the minimum of the biomass of 35 mg/m^2 (0.002%) was due to the lowest numerical density, at Țigănaș.

The recent variations of the corophiid from the Iron Gates II damlake show us a continuous diminishing of this group of amphipods from the zone (Popescu-Marinescu, 1987 b; Popescu-Marinescu & Oaie, 1996).

As the gammarids, the corophiids are a good trophic basis for fish.

c. The variation of the numerical density of the corophiids from the phytophilous zoocenoses (Tab. 6)

As in gammarids, the figures presented in the table 6 are just orientative, first of all because the samples were qualitative, and then because they were a few. But, on the basis of the material we had at our disposal we could asssert that, generally, the number of the corophiids from the submerged vegetation decreased from upstream to downstream (also the percentage within the zoocenosis), and on the other side that these amphipods are not characteristic to the phytophilous fauna from the Iron Gates.

The low numerical density both of the corophiids and the gammarids from the submerged macrophytes lead to the idea, which we support, that the phytophilous fauna is an upper level than the benthic one; the correlation between them shows us, in general, that when the zoobenthos is rich, the fauna from the vegetation is poor.

We considered that it was not necessary to deal with the amphipod biomass from the macrophytes, not only because we did not have enough samples, but also because almost all elements of the zoocenosis were limited (Popescu-Marinescu, 2003).

Conclusions

1. *Obesogammarus obesus*, *Dikerogammarus villosus bispinosus* and *Corophium curvispinu* were the taxa with the largest distribution and frequncy in the Iron Gates I damlake, and *Chaetogammarus tenellus behningi* and *Corophium curvispinum*, in the Iron Gates II.

2. The maximum figures of the numerical density were reached by *Obesogammarus obesus* with 68,425 individuals/m^2, at Baziaş, and *Corophium curvispinum*, with 41,775 individuals/m^2, at Moldova Veche.

3. The taxonomical diversity, both of the gammarids and of the corophiids in the two Iron Gates damlakes was diminished in comparison with the components of the whole group from the mouths of the Danube.

4. Within the amphipods from the Iron Gates I damlake there was a larger taxonomical diversity than in the Iron Gates II damlake.

5. From the numerical density and biomass point of view, the gammarids were prevalent among the amphipods from both Iron Gates damlakes. The figures reached by the gammarids were 84,475 individuals/m^2 and 108,240 mg/m^2, at Baziaş, and by the corophiids, 41,775 individuals/m^2 and 8,355 mg/m^2, at Moldova Veche.

6. Important spatial and seasonal variations were remarked both in gammarids and in corophiids.

AMPHIPODA (GAMMARIDAE ŞI COROPHIIDAE) DIN LACURILE PORŢILE DE FIER I ŞI II – DUNĂRE (ROMÂNIA), CU REFERIRE SPECIALĂ LA SITUAŢIA DIN ANUL 2002

REZUMAT

În lucrare sunt prezentate date referitoare la răspândirea, frecvenţa şi diversitatea taxonilor de gamaride şi corofiide din lacurile Porţile de Fier I şi II, punându-se accentul asupra amfipodelor componente ale zoocenozelor bentonice din anul 2002. În acest sens, taxonii cu cea mai mare răspândire şi frecvenţă în lacul Porţile de Fier I au fost *Obesogammarus obesus*, *Dikerogammarus villosus bispinosus* şi *Corophium curvispinum*, iar în lacul Porţile de Fier II, *Chaetogammarus tenellus*

behningi şi *Corophium curvispinum*. Pentru evoluţia în timp a populaţiilor diferitelor forme se prezintă unele date de referinţă. Diversitatea taxonomică în ambele bazine acvatice a fost scăzută, însă comparativ mai ridicată în lacul Porţile de Fier I.

Pe de altă parte, este evidentă variaţia spaţială şi sezonală a densităţii numerice, atât a fiecărui taxon cât şi a totalului gammaridelor şi corofiidelor din anul 2002. În ceea ce priveşte biomasa sunt redate numai datele referitoare la totalul gamaridelor şi corofiidelor, nu şi pentru fiecare taxon. Dominante în cadrul amfipodelor au fost gamaridele, care au deţinut şi un procent mai important în zoocenoză în comparaţie cu corofiidele.

Subliniem şi în această lucrare că, în anul 2002, toţi taxonii de amfipode determinaţi din cele două lacuri Porţile de Fier sunt elemente ponto-caspice.

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