ISSN: 0001-5113
AADRAY

ACTA ADRIAT.,
41 (2): 17-24, 2000

UDC: 595.3 (262.22)
Short communication

An Amphipoda community in the Mar Piccolo Lagoon (Gulf of Taranto, Ionian Sea)

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In the area of Mar Piccolo (Ionian Sea) affected by waste waters a study was carried out concerning the structure, distribution and evolution of an Amphipoda community .

Key words: Amphipoda community, Gulf of Taranto, Ionian Sea

INTRODUCTION

The north-east sector of Mar Piccolo (First inlet) represents the more general condition characterizing a slow water exchange basin into which polluted waters flow.

To carry out an ecological study of this sector, an area has been considered bounded by the coast in the northern and eastern part and by a dry dock for ships in the western part in which animal and vegetable organisms have been sampled in different stations and within one year period.

As concerns Amphipods specifically, this research aimed at studying the community structure, the quantity and distribution of the species and their behavior with relation to food, depending on the environment conditions, that since the 60's has been influencing the natural environment (CARDELLICCHIO *et al.*, 1991; CAROPPO *et al.*, 1994).

Concerning the trophic behavior, it resulted from studies about benthos communities that in an undisturbed environment there is a balance among different food classes. This balance, however, can be broken in a disturbed environment. DESROSIERS *et al.* (1986, 1990) showed that the trophic organization of the carcinological fauna belonging to 12 different communities was mainly influenced by environmental factors such as: hydrodynamism and sedimentation.

The literature at our disposal about Amphipods in the area examined is rather poor: some data can be found in KRAPP-SCHICKEL (1971); PRATO *et al.* (1995); PRATO and PASTORE (1997).

MATERIALS AND METHODS

The four surveying campaigns were carried out periodically (November 1996, February 1997, April 1997 and September 1997). At the knots of an ideal mesh net (50 m long and 13 m wide) 10 stations were distinguished, from which benthos materials were collected by means of a Van VEEN bucket that samples an area of 25 x 25 cm for an approximate volume of 10 l sediment (Fig.1).

The temperature, salinity and oxygen were measured directly in that area, using a multi-

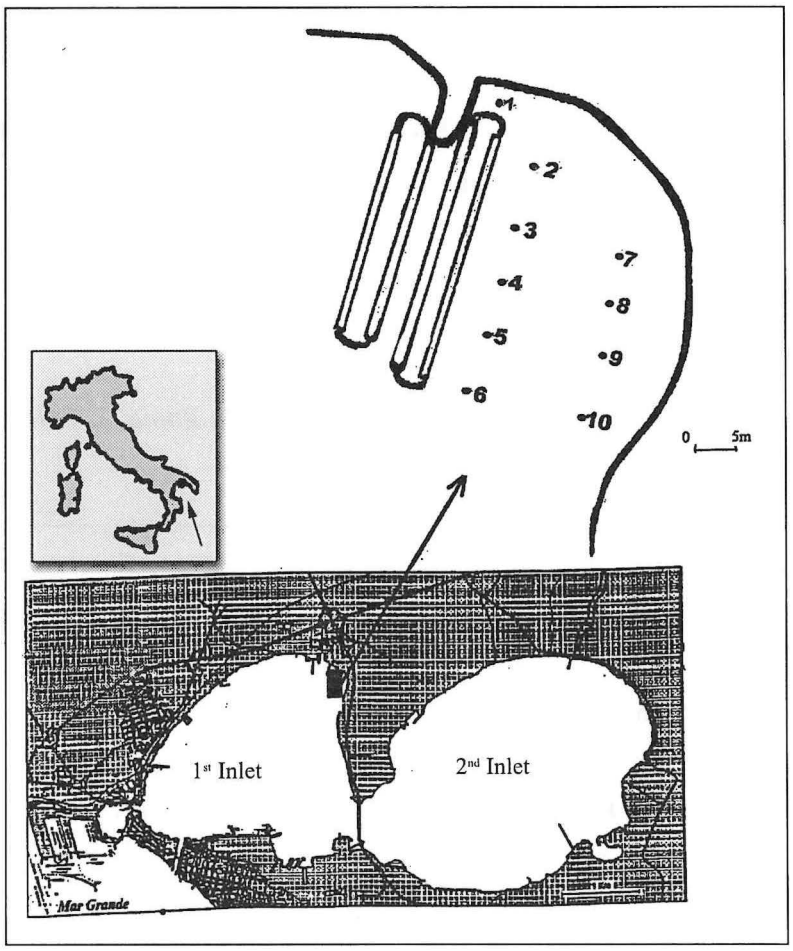

Fig. 1. Locations of sampling stations in Mar Piccolo (First Inlet)

parametric sampler OCEAN SEVEN IDRONAUT.

The materials were sifted on board of the ship used, through a 2 mm mesh screen; the residue, collected in PVC containers, was fixed with 4% formaldehyde. Subsequently, a selection was made through which Amphipod Crustaceans were counted up and classified, and for each species the percentage frequency of finding was calculated.

The identification of trophic groups was mainly based on data coming from the literature (SCIPIONE, 1989; GAMBI, 1992; GREZÉ, 1968; KRAPP-SCHICKEL, 1969; BACHELET, 1981; DESROSIERS *et al.*, 1986).

The 6 trophic categories were distinguished: herbivores detritivores (He-DF); detritivores-suspensivores (DSF); detritivores (DF); herbivores (He); suspensivores (SF); omnivores (Om).

Both the number of trophic groups and the predominant trophic quantities in each station were calculated from the data obtained. Moreover, for the whole population the SHANNON index and the Evenness were determined, as well as the intercenotic affinity using the SØRENSEN index.

DATA ANALYSIS

Table 1 shows the average values of temperature, salinity and oxygen dissolved, with relation to the different stations of the area examined.

Table 1. Physical data of surface (S) and bottom (B) waters in area examined

		Autumn	Winter	Spring	Summer
Temperature	S	15.97	15.18	15.68	25.71
	B	16.09	14.83	15.03	23.06
Salinity	S	36.65	36.25	36.51	37.10
	B	37.80	38.00	38.04	38.12
Oxygen	S	6.30	7.21	9.88	8.72
	B	6.42	7.32	9.02	4.62

Table 2. The list of species found in the four sampling campaigns; feeding guilds and sampling sites. HeDF=Herbivorous-deposit feeders, DSF=Deposit-suspension feeders, DF=Deposit feeders, He=Herbivorous feeders, SF=Suspension feeders, Om=Omnivorous feeders

SPECIES OF AMPHIPODS	Feeding guilds	Autumn	Spring	Summer	Winter
Microdeutopus anomalus	HeDF		2, 7, 8		
Corophium acherusicum	DSF	10			7
Corophium acutum	DSF	10		7	5, 7
Corophium insidiosum	DSF	10	7, 8		
Ericthonius brasiliensis	DSF				5, 7
Gammarella fusicola	DF		7, 8, 10		
Gammarus aequicauda	He		8, 10	7, 8	7, 8
Jassa marmorata	SF	10			
Leucothoe richiardii	SF				5
Caprella acanthifera	Om		10		8
Caprella andreae	Om		2, 3	6	3, 6
Caprella equilibra	Om				
Caprella liparotensis	Om		8		7, 8
Pthisica marina	Om				3, 5

Table 2 indicates the species of Amphipods captured in the area examined. The 14 species were identified, for a total amount of 201 specimens. 74.02% of all samples collected belong to the Gammaridaea group, while 25.98% of them to the Caprellidaea.

Figures 2-3 show the percentage frequency trend of Amphipods in the 4 samplings. Generally, in the campaigns carried out in summer and autumn a considerable decrease both in the number of species and individuals was observed, compared with what resulted in the campaigns carried out in spring and winter.

In the surveyed area the population was represented above all by species considered as typically euryhaline and eurythermous - commonly found in unstable environments - such as: *Microdeutopus anomalus, Corophium acherusicum, Corophium acutum, Corophium insidiosum, Ericthonius brasiliensis* (DIVIACCO, 1980, 1983; KEVREKIDIS and KOUKOURAS, 1988).

Table 3 indicates the values of Density, SHANNON index (H'), Evenness (J) and specific Richness (d).

The densities observed range from 90.0 ind m^{-3} (in summer) to 2477.3 ind m^{-3} (in winter). The values of SHANNON index emphasized a specific diversity equal to H' = 1.88 in the winter sampling, while in the other months it ranged between H' = 1.08 and H' = 1.28.

Moreover, a good homogeneity in the species came out, whose values ranged between J = 0.99 and J = 0.65.

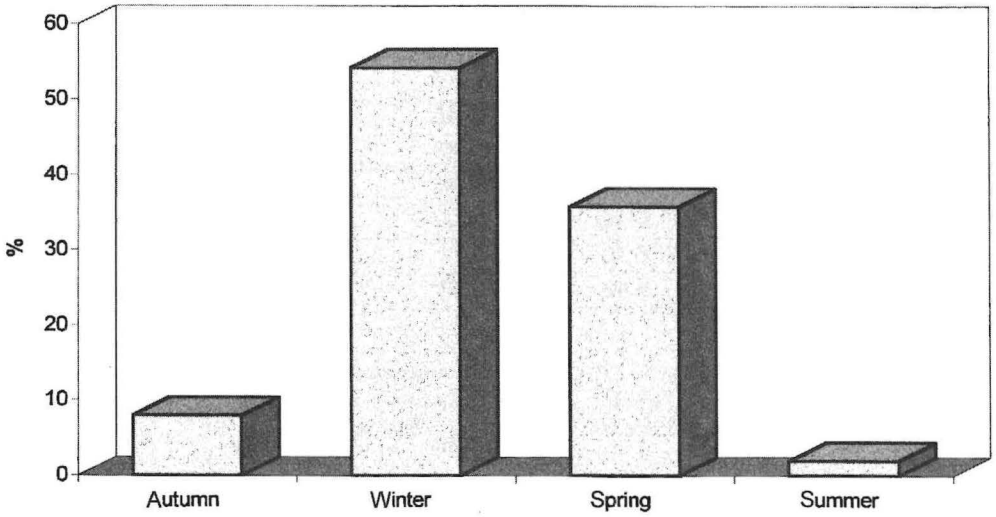

Fig. 2. The seasonal variation percentage of individuals collected in four surveys

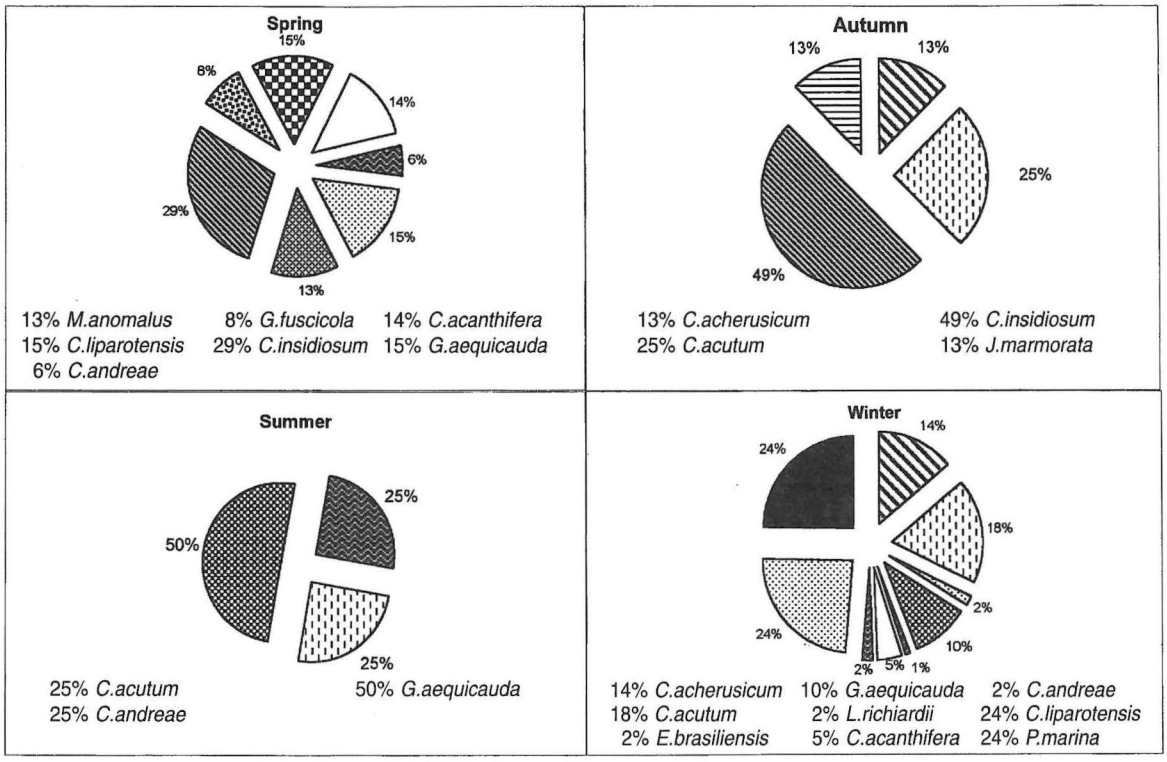

Fig. 3. The variation percentage frequency of the species of Amphipods collected in four samplings

Concerning the specific richness, the highest value was obtained once again in winter, d = 1.71, while in the other periods the richness ranged from d = 1.44 to d = 1.08.

The SØRENSEN index emphasized a low intercenotic affinity among the 4 samplings (Table 4).

The selected species were gathered into 6 groups, depending on their trophic category (Table 5).

The qualitative-quantitative analysis of the trophic groups showed that Detritivores-Suspensivores, represented by *Corophium acherusicum, Corophium acutum, Corophium insidiosum, Ericthonius brasiliensis,* can be found in every season, followed by herbivores and omnivores, which can be found in every season, except in autumn.

Table 3. Density values (ind/m³), Shannon index (H'), Eveness (J), and Specific Richness of Margalef (d)

	DENSITY	H'	J	d
dec-96	363.6	1.09	0.78	1.08
feb-97	2477.3	1.88	0.85	1.71
apr-97	1636.4	1.28	0.65	1.40
sep-97	90.9	1.08	0.99	1.44

Table 4. The Sørensen index (S) among four surveys

Autumn	/			
Winter	21.05	/		
Spring	11.11	27.58	/	
Summer	25	31.57	22.22	/
	Autumn	Winter	Spring	Summer

Table 5. Trophic analysis of the feeding guilds founded in the four seasons (n=species numbers, n%=percentage of species numbers, N=individuals numbers, N%=percentage individuals numbers)

	Autumn				Winter			
Feeding guilds	n	n%	N	N%	n	n%	N	N%
HeDF								
DSF	3	75	14	87.5	3	33.3	37	37.4
DF								
He					1	11.1	11	11.1
SF	1	25	2	12.5	1	11.1	1	1
Om					4	44.5	50	50.5
TOTAL:	4		16		9		99	

	Spring				Summer			
Feeding guilds	n	n%	N	N%	n	n%	N	N%
HeDF	1	14.3	9	12.5				
DSF	1	14.3	21	29.2	1	33.3	1	25
DF	1	14.3	6	8.3				
He	1	14.3	11	15.3	1	33.3	2	50
SF								
Om	3	42.8	25	34.7	1	33.3	1	25
TOTAL:	7		72		3		4	

DISCUSSION

The specific composition of Amphipoda population in the 4 periods examined, suggests the following considerations:

- the population seemed to be quantitatively rather poor in individuals, although, according to the Evenness index, it resulted quite heterogeneous, as concerns the species
- the population cenotic modifications seem to be influenced by seasons, with the highest levels in winter (in terms of Abundance and specific Richness) and the lowest levels in summer.

Such situation represents the environment conditions of the basin examined, which are characterized by slow movements of water masses due to weak tidal streams, whose ranges amount to few centimetres (~ 7 cm in syzygy, ~ 20 cm in quadrature). This causes water stratification in summer and makes O_2 supply difficult in the depths, where reduction reactions often take place with evolvement of H_2S, NH_3 and precipitation of metallic sulphides, which are made evident by the formation of blackish and evil-smelling mud (CAROPPO, *et al.*, 1994).

All this causes both unstability in benthos communities and phenomena of biomass rarefaction at the bottom.

Therefore, the functional and structural adaptation of Amphipoda communities of the moving bottom is most likely to be influenced by environmental conditions, such as: poor hydrodynamism, high sedimentation and evolvement of reduction reactions in sediments. These phenomena both foster the relative predominance of typical species from harbor environments and in all probability determine a sort of species selection supporting those euryecic species, which are able to adapt themselves and bear the environment compromission (CONRADI and CERVERA, 1995).

Thus, taking as a model the area examined, with relation to the Amphipoda community, we suggest that the same situation can be observed anywhere else, provided that a similar environment compromission occurs.

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Accepted: 16 March 2000

Zajednica amfipoda u laguni Mar Piccolo (Tarantski zaljev, Jonsko more)

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SAŽETAK

U području Mar Piccolo (Jonski zaljev), koje je pod utjecajem otpadnih voda, izvršen je studij strukture, rasprostranjenosti i evolucije zajednice amfipoda.