Seasonal variation of some heavy metals in the zooplancton of Izmir Bay

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At the first step in the trophic level of marine environment planktonic organisms absorbe pollutants, coming in to the environment from different sources, by being suspended in the medium and by having wide total surface. Directly or indirectly accumulated dissolved materials were then transfered to the human body through food chain as the plankton being pray to the carnivorus organisms (UYSAL,1975).

Some heavy metals are well-known to be a treat for human life which may consequently be a cause of death (ENGEL *et al.*, 1981; COOPER, 1980; I.R.P.T.C.,1980; MEDINA *et al.*, 1988).

Therefore it had been decided to determine the levels of pollutants accumulated in zooplankton. The samples were collected from 9 stations where the areas effected by domestic and industrial discharges (UYSAL and TUNCER, 1982), in Izmir Bay, by means of plankton nets of 0.5 m diameter and 200 µm mesh-size (Fig.1). All samples dominatly contain Copepods, Cladocerance, obtained in throughout 1989 had been analysed for the Hg_t and Cd by using "Atomic Absorption flame spectrophotometer Varian Techtron Model 1250" and calculated as $\mu g.g^{-1}$ wet weight basis (BERNHARD, 1976; UYSAL and TUNCER, 1982).

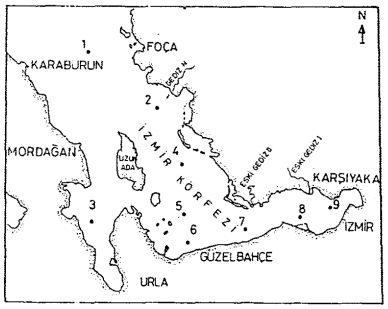

Figure 1. Sampling stations

According to the results of the analysis, it can be seen some changes from Table 1. Hg_t concentration varied between 0.012 and 1.896 $\mu g.Hg_t.g^{-1}$ and Cd concentration varied between 0.054 and 16.790 $\mu g.Cd.g^{-1}$. As a result of accumulation levels in these metals, it has been found out that Cd>Hg.

In general, heavy metal concentrations in marine organisms are tending to increase during summer period. Also, considerably high heavy metal concentrations of zooplanktonik organisms during summer period was possibly due to the increased metabolic activity of these organism. As conclusion; it has been necessary to determine the accumulated levels in planktonic organisms because of their importance as first step marine food chain organisms longing up to the human being continuously and periodically.

Table 1. Cd and Hg concentrations of zooplancton samples collected from Izmir Bay.

Sta.	Metal	Winter	Spring	Summer	Autumn
1	Hg	-	0.646	1.896	0.235
	Cd	-	0.984	0.214	0.790
2	Hg	0.106	-	0.207	0.024
	Cd	0.271	-	0.237	0.622
3	Hg	0.366	1.105	0.721	0.089
	Cd	0.419	4.210	0.329	0.245
4	Hg	0.272	0.078	0.630	0.035
	Cd	0.484	0.158	0.320	0.265
5	Hg	-	0.195	0.440	0.035
	Cd	-	0.248	16.790	0.336
6	Hg	0.080	0.071	0.239	0.121
	Cd	0.122	0.180	0.182	0.278
7	Hg	0.105	0.052	0.213	0.012
	Cd	0.160	0.411	0.054	0.077
8	Hg	0.140	0.082	0.229	0.066
	Cd	0.106	0.126	0.174	0.416
9	Hg	0.140	0.065	0.538	0.022
	Cd	0.106	0.049	0.205	0.071

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Seasonal changes in faecal indicators distribution in Northernmost part of the Adriatic Sea

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Coastal contamination by wastes in the northernmost part of the Adriatic Sea is described by using multivariate analysis on microbiological indexes.

Coastal contamination is of particular interest because it is the result of waste discharges from both industrial and domestic sources. The polluting agents are of physical, chemical or biological nature. In order to establish the influence of the wastes, treated or untreated, on the coastal seawater of the Northern Adriatic Sea, the microbiological quality of the water was evaluated by analysis of faecal pollution's indicators.

Seasonally, from January 1991 to December 1991, a monitoring program was carried out in 28 stations, located at 200m (st. 0), 500m (st.1), 1000m (st.2) and 3000m (st.3) offshore, in the Gulf of Trieste stretching from the mouth of the River Tagliamento to the Bay of Muggia (Fig. 1).

Water samples were analyzed for Total Coliforms, Faecal Coliforms and Faecal Streptococci by the multiple tube technique (Standard Methods, 1989). Simultaneously in every station, physical - chemical parameters were determined by the multiprobe 401 Idronaut.

For classifing the stations on the basis of faecal pollution's indicators a cluster analysis, multivariate analysis method, was carried out (LAGONEGRO and FEOLI, 1985). The correlation coefficient among faecal pollution indicators was also calculated (Tab.1).

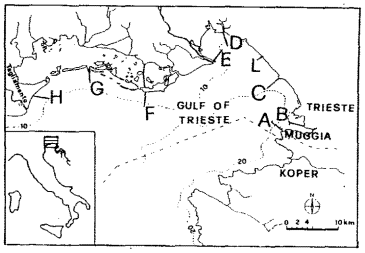

Fig. 1 : Map of the stations

Tab. 1: Correlation coefficient among faecal pollution indicators.

	MARCH			JUNE			SEPTEMBER			DECEMBER		
	TC	FC	FS	TC	FC	FS	TC	FC	FS	TC	FC	FS
TC	1.00	0.83	0.48	1.00	1.00	0.20	1.00	1.00	0.21	1.00	0.41	0.44
FC		1.00	0.51		1.00	0.20		1.00	0.21		1.00	0.84
FS			1.00			1.00			1.00			1.00

TC = Total Coliforms **FC** = Faecal Coliforms **FS** = Faecal Streptococci

degree of freedom = 26 significance level = 0.01 R = 0.4736

In summer (June) and in autumn (September) similar distribution of faecal indicators was observed and it revealed mostly urban pollution. In fact, the stations influenced by urban wastes are connected among each other (Fig. 2: group 1.1.1). Water column stratification in this periods probably does not allow the faecal input to dilute. It remains confined to the surface.

Spring (March) and winter (December) cruises show different situations. In March some stations seems to be affected by fresh water inputs, whereas other stations suffer urban wastes. Homogeneous conditions of the water column during the winter cruise (December) helped to dilute both river and urban inputs. Probably, for this reason, most of the stations are placed in the same group (Fig. 3 : group 1 . 1 . 2).

Some seasonal differences have been observed also considering the correlation coefficient between pollution indicators. In June and September the correlation coefficient was highly significant only between Coliforms, while in March and December highly significant values were calculated between Coliforms and Streptococci (Tab. 1).

The method used to analyse distribution of faecal indicators seems to give correct informations about the real pollution conditions of the investigated area.

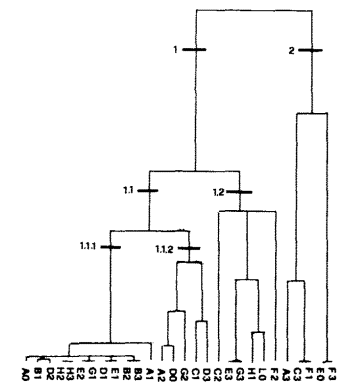

Fig. 2 : classification of the stations in the summer cruise.

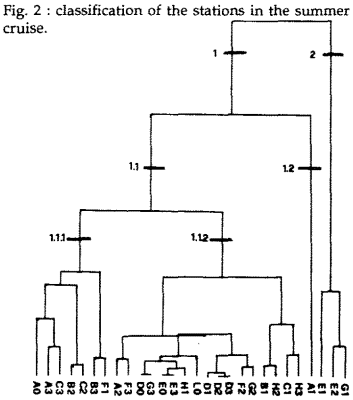

Fig. 3 : Classification of the stations in the winter cruise.

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