

Heavy metal concentrations in selected marine species from fisheries bays of Aegean coast

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As indicated before Aegean coastline is long and has a large number of fishery areas, Bay and Estuaries (UYSAL, 1980; DEMIRKURT *et al.*, 1990). Due to increased industrial, touristic, urban and agricultural activities important quantities of chemical pollutants are entering our coasts from different sources. Those waste disposals are affecting the ever increasing portion of our bays of coastal regions. The pollution results in a demunition of edible organisms and decrease in the quality of marine life. It also effects human health through food chain. For this reason, the knowledge of levels of pollutants in edible marine organisms is important for the public health (ANDREOTIS and PAPADOPOULOU, 1982). However, in recent years considerable amount of work has been carried out in relation to the accumulation and distribution of heavy metals in the marine biota (BEI *et al.*, 1990). The purpose of this survey is to determine the level of heavy metals (Cu, Mn, Zn, Fe, Pb, Cd) in selected species in polluted and unpolluted part of our Aegean coasts.

In this study the samples considered are *Tapes decussatus* L., *Patella* Spp., *Mytilus galloprovincialis* Lam., *Cardium edule* L., *Sepia officinalis* L., *Natica millepunctata* Lam., *Mugil* Spp., *Solea vulgaris vulgaris*, (QUENSEL, 1804), *Anguilla anguilla* L., *Diplodus annularis* L., *Dicentrarchus labrax* L., *Ulva* Spp., *Enteromorpha* Spp., *Cladophora* Spp. These were collected from different polluted coastal regions (especially Izmir Bay and its vicinity) (Fig. 1).

All samples were wet digested with HNO₃, HClO₄ (5:1) and HCl, by heating on a hot-plate and analysed by using "Varian Techtron Atomic Absorption Flame Spectrophotometer Model 1250".



Figure 1. Sampling side along in Aegean coast line

The concentration of each heavy metals was determined separately in selected marine species in the different sampling areas from our coasts (Fig.1, Table 1). As can be seen from the table too, the heavy metal concentrations show variations depending on the species and locality. In general the levels of heavy metal concentration are as follows : Fe>Zn>Cu>Mn>Pb>Cd.

There are still nontoxic levels in the mentioned species that could be dangerous to the consumers, but it will be better to continue periodically the regional comparative survey on the pollution effects on the representative indicator species of the different marine biotops for the benefit of public health.

Our present results have been varified and the values obtained are within acceptable limits when compared with those other parts of the Aegean Sea (UYSAL, 1980, BEI *et al.*, 1990). However, heavy metal levels of mentioned food chain organisms may not be taken into account for today, but in the very near future it's alarming that there will be some hazardous conditions if more effective and serious legislations would not be held urgently.

Table 1. The levels of heavy metals which were determined in some edible marine species collected from Aegean coasts (µg/g Dry Weight)

Species	Dry weight %	Cu	Mn	Zn	Fe	Pb	Cd	
1 Aliğa Bay	<i>Tapes decussatus</i> L.	18.8	4.556	7.874	113.38	268.50	1.417	2.362
	<i>Mytilus galloprovincialis</i> L.	18.6	2.260	4.785	162.67	118.18	2.153	0.478
	<i>Patella</i> spp.	28.9	2.638	5.838	93.46	731.50	1.227	1.252
	<i>Sepia officinalis</i> L.	23.7	0.655	0.328	26.56	12.90	0.197	0.328
	<i>Natica millepunctata</i>	18.0	11.700	3.000	131.00	106.00	1.800	1.000
	<i>Ulva</i> spp.	17.2	2.946	8.298	21.57	223.23	1.493	0.415
	<i>Enteromorpha</i> spp.	23.3	0.810	7.044	9.89	415.93	0.295	0.046
2 Foça Bay	<i>Patella</i> spp.	18.7	2.773	21.048	42.57	800.00	1.758	0.781
	<i>Ulva</i> spp.	22.0	1.556	31.456	19.86	264.90	0.596	0.662
	<i>Enteromorpha</i> spp.	25.4	2.789	35.882	35.54	462.99	0.612	0.170
3 Izmir Bay	<i>Tapes decussatus</i> L.	17.6	4.112	9.412	44.70	131.76	3.176	2.352
	<i>Patella</i> spp.	22.6	3.699	14.121	79.09	583.00	1.323	1.244
	<i>Mytilus galloprovincialis</i> L.	15.2	5.959	18.413	2995	107.67	1.849	1.369
	<i>Cardium edule</i> L.	18.9	2.439	87.046	103.10	375.13	2.332	0.518
	<i>Sepia officinalis</i>	23.4	6.428	2.143	21.42	15.71	1.285	0.357
	<i>Solea solea vulgaris</i> Q		1.185	1.546	17.01	22.68	0.927	0.515
	<i>Mugil</i> spp.	23.3	1.478	1.747	12.17	16.11	0.533	0.387
	<i>Diplodus annularis</i> L.		1.041	1.357	17.20	12.67	0.407	0.452
	<i>Ulva</i> spp.	14.3	1.298	6.104	9.10	1718.95	0.537	0.448
	<i>Enteromorpha</i> spp.	13.5	2.333	52.708	35.17	583.33	1.333	0.416
Çalburnu fishery	<i>Tapes decussatus</i> L.	17.7	1.520	4.360	82.97	146.28	1.960	0.436
Deniz Bostanlığı	<i>Tapes decussatus</i> L.	12.3	3.032	5.161	85.81	121.29	0.581	1.935
	<i>Ulva</i> spp.	21.7	4.700	13.000	98.60	958.00	2.700	3.000
	<i>Tapes decussatus</i> L.	20.0	2.850	4.830	83.80	384.73	0.869	0.242
Sahilevleri (İnciraltı)	<i>Venus verrucosa</i> L.	17.5	1.628	8.492	142.34	640.02	2.54	1.365
Kalabak	<i>Patella</i> spp.	19.6	4.259	59.26	51.85	544.44	5.000	5.535
	<i>Enteromorpha</i> spp.	14.0	0.691	6.323	17.20	222.10	0.529	0.147
Urla iskele	<i>Patella</i> spp.	25.7	2.149	7.476	61.68	119.25	2.523	2.803
	<i>Patella</i> spp.	28.4	1.783	4.851	74.42	810.00	1.395	7.751
	<i>Ulva</i> spp.	13.0	15.535	14.184	14.89	1096.09	2.553	0.709
4 Çeşme Harbour	<i>Patella</i> spp.	14.0	3.833	13.333	93.33	281.50	4.500	5.000
	<i>Ulva</i> spp.	11.3	10.682	19.318	29.54	1331.82	3.068	3.409
	<i>Enteromorpha</i> spp.	12.7	11.848	32.203	44.54	286.89	3.715	2.521
	<i>Enteromorpha</i> spp.		2.011	3.940	9.65	183.86	1.580	0.877
5 Köyceğiz Fishery	<i>Mugil (Liza) ramada</i>	21.7	1.326	29.392	16.88	31.69	0.636	0.422
	<i>Diplodus annularis</i>	25.5	0.950	2.066	19.42	1.612	0.743	0.826
	<i>Dicentrarchus labrax</i>	20.1	0.744	49.51	18.12	12.62	1.165	0.647
	<i>Anguilla anguilla</i> L.	21.4	0.926	67.10	53.85	51.46	1.432	0.265
	<i>Cladophora</i> spp.		9.168	5.093	35.14	669.13	0.764	0.679
<i>Enteromorpha</i> spp.		0.695	81.64	28.52	983.34	1.711	1.901	

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