Mercury distribution in the Aegean coast of Turkey

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ABSTRACT

The surface sea water and sediment samples collected from Aegean Sea were analyzed for their total mercury content. In total four cruises have been carried out in the Aegean Sea during 1987 with the research vessel R/V BILIM which belongs to Middle East Technical University Institute of Marine Sciences. The overall average concentration is found to be 19±11 ng/l with a range of 4 to 57 ng/l. The possible land based sources were also searched and found that the rivers draining the extensively cultivated and mercury mining area of the Western Anatolia are primary source of the mercury input, *i.e.* mercury concentrations up to 73 ng/l were measured in the regions receiving river discharges.

Sediment samples collected from different locations of the Aegean Sea were analyzed for their total mercury content. Analysis results shows that the sea water quality is reflected in the underlying sediment. Biota analysed were *Mytilus galloprovincialis* and *Mullus barbatus* and the later one showed significantly higher mercury levels.

Sublethal effects of Zinc on the survival and the fertility of four successive generations of Tisbe Holothuriae

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In this study we determined the survival and fertility of succesive generations of the harpacticoid copepod Tisbe holothuriae, after exposure to three sublethal concentrations of zinc (0.07 0.01 and 0.007ppm Zn).

The experiments carried out in the laboratory, under a set of controlled conditions : temperature 18±0.5 C, 38‰ salinity and a photoperiod of 12h light, 12h darkness.

Statistical analysis of the results was performed by the paired t-test and the linear regression analysis.

Concentrations

Generations	0.07 ppm Zn %	N	C	0.01 ppm Zn %	N	C	0.007 ppm Zn %	N	C	0.00 ppm Zn %	N	C
F1	7.61+2.71	79.20	20.80	1.18±1.02	85.70	14.30	1.75±0.89	72.90	27.10	0.81±0.56	51.66	48.34
F2				0.97±0.50	81.80	18.20	0.84±0.63	67.50	32.50	0.74±0.21	40.08	59.92
F3				1.29±0.79	88.80	11.20	1.51±0.70	52.17	47.83	0.58±0.25	41.50	58.50
F4				6.46±2.43	85.40	14.60	1.04±0.45	64.28	35.72	0.53± 0.24	49.95	50.05

Table 1. Percentage mortality for each generation of T.holothuriae at different concentrations of zinc. Percentage contribution to mortality of nauplii (N) and copepodits (C).

For the 0.07ppm Zn, concentration equal to 1/10 of the LC50 (48h), population size is reduced to zero after the first generation , whereas population size of the fourth generation is not affected for a concentration of 0.007ppm Zn. The highest mortalities were noticed at a concentration of 0.07ppm Zn for the first generation and at a concentration of 0.01ppm Zn for the fourth, while nauplii proved to be more sensitive than copepodits (Tab. 1)

Egg-sacs

Generation - Concentration	1	2	3	4	5	6
F1 0.070	3.6+0.5	2.1+0.6	0.4+0.1			
F1 0.010	25.3+5.8	19.5+4.0	18.8+4.5	11.7+3.1	4.5+1.0	1.3+0.5
F2 0.010	19.6+4.8	5.6+2.5	3.4+2.5	2.1+0.8	0.7+0.3	
F3 0,010	6.6+2.7	4.7+1.8	2.8+1.5	1.1+0.5		
F1 0.007	35.2+8.5	35.0+5.1	31.2+7.1	25.6+6.2	14.8+3.4	3.7+1.5
F2 0.007	15.4+4.7	10.9+3.0	6.4+2.7	4.4+1.6	2.1+0.6	1.4+0.4
F3 0.007	24.2+5.6	16.9+3.5	12.1+3.7	5.6+0.8		
F1 0.000	41.9+8.0	36.6+6.1	28.5+7.1	26.8+5.6	14.3+3.5	8.9+5.4
F2 0.000	21.5+7.0	20.6+5.6	19.4+4.1	15.3+2.1	8.7+2.0	6.3+1.0
F3 0.000	21.9+2.0	21.9+3.5	20.7+5.1	16.5+4.0	12.2+2.1	10.9+3.5

Table 2. Percentage of the population producing egg-sacs for each generation at the different concentrations.

Increasing the metal concentration from 0.000 to 0.07ppm Zn the percentage of animals with egg-sacs were decreased.(Tab.2.)

At 0.07ppm Zn concentration, only the 0.38% of the population produced a third egg-sac whereas of the other concentrations, greater numbers of animals produce up to 5 egg-sacs.

Furthermore the percentage of the population producing egg-sacs decreases from generation to generation at the 0.01ppm Zn dose, something that is not observed for the 0.007ppm Zn dose and for the control dose (0.00ppm Zn.)

The results of this study show that zinc continues to be toxic not only at high concentrations (3), but also at certain sublethal concentrations and especially after prolonged exposure of the population to the pollutant.

The basic effect of heavy metals on marine animals probably involves the inhibition of different enzyme systems.(2).

Furthermore laboratory studies have demonstrated that larval stages of marine invertebrates are more sensitive to metals than the adults.(1).

Knowledge about the possibility of Tisbe to grow normally at different sublethal concentrations is very important, because it allows a deeper understanding of the disturbance caused by heavy metals in the ecosystem.

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