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Organic pollutants in marine environment of the Montenegro Coast South Adriatic

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Organic contaminants from several different classes were analysed in south--eastern part of the Adriatic sea - Montenegro coast. To estimate the level of pollution the conents of organic carbon, total phenols and polycyclic aromatic hydrocarbons were analysed in sea water, while in sediments and marine organisms were determined the contents of aromatic as well as chlorinated hydrocarbons.

The organic carbon concentration is a measure of content of organic matter and in the same time the measure of the productivity of system.

Phenol compounds in aquatic ecosystem could be of synthetic or naturally occuring. The pathological effect of phenols on fish reffered to acute and subacute poisoning.

Chlorinated pesticides (DDT and metabolites, DDD, DDE), polychlorinated biphenyls (PCB) and polycyclic aromatic hydrocarbons (PAH) are ubiquitous pollutants which have a similar environmental fate. On the other hand they have quite different origins and can be used as a tracers for agricultural (DDT), industrial (PCB) and mixed industrial and urban contamination (PAH).

South Adriatic is relatively low investigated and there is no information about organic pollutants contents. It was chosen 7 sampling stations (Fig. 1) and the seawater, sediments, fish and shellfish samples were collected.

The concentrations of organic carbon in seawater were analysed with acid bichromate titrimetric method and total phenols were determined colorimetrically with

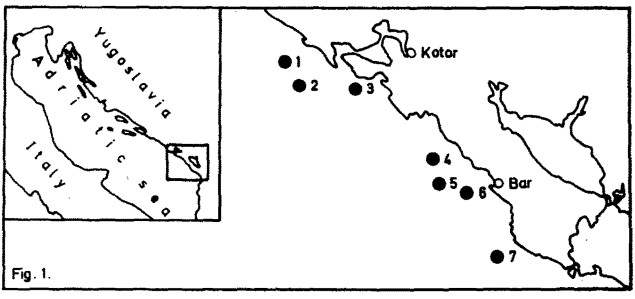

Fig. 1.

antipyrine method. PAH content in seawater, sediments, fish and shellfish were analysed with fluorescence technique (Perkin-Elmer 3000 fluorimeter) with conventional and synchronous scanning mode. Chlorinated hydrocarbons were determined by gas chromatograph (Pye Unicam 4550).

The concentrations of organic carbon in seawater ranged from 0.97 to 4.19 mg C/dm^3 what is in the same level determined in North Adriatic.

The mean value of total phenol concentrations was 1.6 µg/dm^3 determined in September 1988, while in December of the same year it was higher (4.0 µg/dm^3). A very small variability in results in water column shows a good vertical mixing of the sea masses.

The total PAH contents in seawater were at all station below the detection limit of applicable method and are found to be 0.14 ug chrysene equvalents/dm^3. The same values were determined in middle Adriatic and we can conclude that the seawater of the Adriatic sea is not contaminated with these compounds.

Total PAH contents in sediments varied from 0.52 to 3.41 µg/g. It was noticed the increasing trend in PAH contents toward the south, that could be explained with larger terrigeneous influence of Bojana river.

The same group of aromatic compounds were also determined in marine organisms fish (Mullus barbatus) and shellfish (Lithophaga lithophaga). The total PAH contents in fish ranged from 0.66 to 3.08 µg/g while in shellfish it was not determined the large differences in PAH contents between samples and it ranges from 0.22 to 0.73 µg/g. All values of PAH content are given in chrysene equivalents and in relation to dry weight.

The synchronous mode of scanning was also applied for all samples of sediments, fish and shellfish. From the obtained spectra it is evident that fish and shellfish accumulate most aromatics with two rings while in sediments beside these compounds it was found also aromatics with five and more rings.

Chlorinated hydrocarbons in sediments were generally low and not always presented. It was found a larger amount of these pollutants in fish and shellfish especialy DDT and its metabolites.

The contents of HCB in fish varied from 0.01 to 1.27, HCH from 0.01 to 0.42, lindan from 0.28 to 2.26, pp'DDE 0.01 to 4.95, pp'DDD 0.01 to 0.84, pp'DDT 4.17 to 15.14 and PCBs from 0.01 to 297.31 µg/kg. The same group of compounds was also determined in shellfish and the results are as follows: HCB - 0.01 to 0.49, ΔHCH - 0.02 (mean value), lindan - 1.70 (mean value), pp'DDE - 8.18 to 14.42, op'DDT - 1.75, pp'DDD - 0.32 to 0.67, pp'DDT - 2.80 to 3.56, PCBs - 0.01 µg/kg.