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POLYCHLORINATED BIPHENYLS AND CHLORORGANIC PESTICIDES IN ALGAE FROM THE BALTIC SEA

O. ROOTS, H. KUKK. KLOORORGAANILISTE PESTITSIIDIDE JA POLÜKLOREERITUD BIFENÜÜLIDE SISALDUS LÄÄNEMERE VETIKATES

О. РООТС, Х. КУКК. СОДЕРЖАНИЕ ХЛОРОРГАНИЧЕСКИХ ПЕСТИЦИДОВ И ПОЛИХЛОРИРОВАННЫХ БИФЕНИЛОВ В ВОДОРОСЛЯХ БАЛТИЙСКОГО МОРЯ

(*Presented by O. Eisen*)

Polychlorinated biphenyls (PCB) and chlororganic pesticides attract attention, first of all, due to their long-term existence in the surrounding environment and their ability to accumulate in living organisms. In our previous papers we have analyzed PCB and DDT concentrations in the plankton [1, 2], fish [3, 4] and molluscs [5] of the Baltic Sea.

Macroalgae may be considered important indicators when studying the distribution, transformation and decomposition of chlororganic compounds in the ecosystem of the Baltic Sea. Since algae are not included in the monitoring programme of the Baltic Sea, their biphenyl content has been insufficiently studied so far [6].

Algae samples were collected on September 16—19, 1984, during the cruise of the research vessel "Aju-Dag". To eliminate the possible contamination of algae samples with ship's paint, samples were collected from a boat at the distance of one kilometre from the ship [7]. The technique applied for the determination of the chlororganic compounds is presented in [3]. Clophen A-50 served as a PCB standard.

To get a more detailed picture about the transition of substances in the sea the coefficients characterizing their bioaccumulation from the water into algae were calculated (the Table). In the water of the open Baltic (Ariste Bay) and the Gulf of Finland (Kolga Bay) the concentrations of PCB and the summary DDT were calculated as 6.9 and 0.36 ng/l, and 4.3 and 0.13 ng/l, respectively (in the air above the open part of the sea PCB concentrations did not exceed 0.13 ng/m^3, and those of the summary DDT 0.09 ng/m^3). In most cases (with the exception of DDT in Kolga Bay) the coefficients obtained proved to be lower than the earlier ones in fish and plankton [8]. The concentrations of chlororganic pesticides determined in the water calls for careful application because in the study area they may show considerable diurnal variations depending on the water temperature, salinity, the content of plankton in the water, etc. [4]. The concentration of the summary DDT, as a rule, does not exceed 0.1 ng/l. In shallow sea areas one may observe the so-called secondary pollution where under certain conditions PCB may accumulate from bottom sediments into water and even re-enter the atmosphere [9].

Concentration of chlororganic pesticides and polychlorinated biphenyls in algae from the Baltic Sea, June 1984 (on wet weight (I) and on lipid weight (II) basis, μg/kg)

Biological object	Station		Lindan	p′p′DDE	p,p′DDD	p,p′DDT	ΣDDT	PCB	Coef. bioaccum.	
									DDT	PCB
Fucus vesiculosus	Ariste Bay	I	0.06	1.3	—	1.7	3.2	12.9	9000	1870
		II	4.3	93	—	124	226	920		
Furcellaria lumbricalis	„	I	0.05	0.6	—	2.3	3.0	9.5	8300	1380
		II	2.8	34	—	129	167	528		
Ceramium rubrum	„	I	0.12	0.3	—	—	0.3	8.7	830	1260
		II	40.0	103	0.6	—	113	2900		
Fucus vesiculosus	Kolga Bay	I	0.08	1.0	106	4.2	6.0	9.4	46150	2170
		II	13.3	158	—	700	992	1567		
Cladophora glomerata	„	I	0.23	3.3	—	5.5	9.2	37.9	70770	8750
		II	16.4	236	—	395	654	2707		
Ectocarpus confervoides	„	I	0.46	1.0	—	6.2	7.3	12.0	56150	2770
		II	65.7	141	—	886	1041	1714		
Pilayella littoralis	„	I	0.05	1.5	—	—	1.6	7.3	12310	1690
		II	8.3	248	—	—	273	1216		
Dictyosiphon foeniculaceus + Ceramium tenuicorne	„	I	0.006	1.0	—	—	1.1	8.8	8460	2030
		II	4.6	74	—	—	81	677		

The above-mentioned shows that the results obtained are difficult to compare since the lipid concentrations may vary with different species of algae as well. The lowest PCB concentrations (on lipids) were determined in *Furcellaria lumbricalis* (an algae species of commercial importance in Estonia) and in *Dictyosiphon foeniculaceus + Ceramium tenuicorne*. In the Baltic Sea *Furcellaria* has revealed the lowest benzo(a)pyrene content as compared with other algae species [10]. PCB and DDT concentrations vary also in the samples of algae of the same species collected form different areas. PCB concentrations determined in *Fucus vesiculosus* proved to be lower than those determined by M. Olsson et al. in 1969 [6].

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