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Polychlorinated Biphenyl Accumulation in Grey Mullets *(Chelon labrosus)*: Effect of Age

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Polychlorinated biphenyls have been found in fishes from whole world (KOEMAN et al. 1969, ZITKO 1971, RICHOU-BAC et al. 1972) and general environmental contamination by these compounds has been reviewed by PEAKALL (1972). Many workers reported that organochlorine residues concentration in fishes was found to be proportional to their age (BACHE et al. 1972, YOUNGS et al. 1972). An experimental laboratory intoxication was carried out to study the effect of age on the accumulation of a French PCB (Phenoclor DP6) in grey mullets.

METHODS

The fishes were netted in October 1977. Their ages were known by scale observation (CASSIFOUR, 1975) and were expressed in number of winters.

Twelve mullets 2,5 years old and 12 mullets 3.5 years old were fed a dry fish diet (AQUALIM) contamined by DP6 to a concentration of 50 μg/g. Groups of 4 fishes were sacrified after 8, 15 and 30 days of DP6 ingestion. Table 1 shows the average weights and lengths of fish groups at time of sacrifice. Each mullet was digested "in toto" by chloridric acid. Lipids and PCB were extracted from hydrolysate by petroleum-ether using hot extraction in ABRAHAM et al. (1964) apparatus. After cleanup according with MURPHY (1972) the samples were chromatographed in INTERSMAT IGC 16 gas chromatograph with ^{63}Ni EC detector. The gas column fillings used were chromosorb WAW (DMCS) 100-120 mesh and 5 % SE 30. Phenoclor® DP6, Prodelec France, was used as diet contaminant and as standard.

RESULTS AND DISCUSSION

Table 2 lists the average concentration of PCB in mullets as a function of time of DP6 ingestion in both age groups. The relation coefficient (k) for DP6 concentration in carcass as a function of time of intoxication was nearly identical in both age groups. However, the DP6 concentration in carcass was always

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TABLE 1
Average weight and length of mullet groups at time of sacrifice.

Time of intoxication (days)	8	15	30
2.5 year old group			
weight (g)	30 ± 2 [a]	46 ± 5	42 ± 5
length (cm)	16 ± 1	17 ± 1	16 ± 0.7
3.5 year old group			
weight (g)	66 ± 6	84 ± 9	139 ± 24
length (cm)	20 ± 0.5	23 ± 1	24 ± 2

a. mean ± SE

higher in 3.5 year old fish group than in 2.5 year old ones (+ 45% after 30 days). BACHE et al (1972) reported that the relation between the concentration of PCB in the Cayuga lake (NEW-YORK) trout and their age was a curve represented by an exponential equation. The difference in the PCBs concentration between trout 3 year old and trout 4 year old was 115%.

Figure 1 shows gas chromatograms of DP6 in a 3.5 year old mullet and of Phenoclor DP6 standard. The relative peaks heights of individual DP6 isomers in the chromatogram did not vary with the age of the fish. This would indicate that there is no selective metabolism of specific DP6 components in mullets.

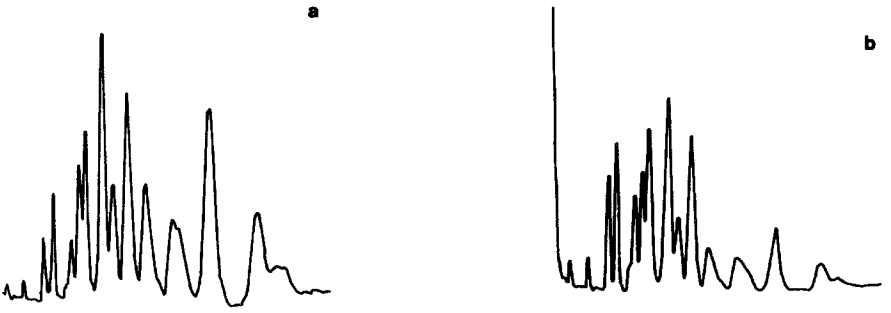

Figure 1 - Gas chromatograms of standard DP6 (a) and extract of fish fed DP6-contamined food (b)

TABLE 2

Effect of age on residues of DP6 found in grey mullets as a function of time of intoxication

Age (years)	Time of intoxication			Storage coefficient (k)[b]	Correlation coefficient	Significance[c] P
	8	15	30			
	residues of DP6 in ppm					
2,5	3,0 ± 0,3[a]	3,8 ± 0,2	5,1 ± 0,9	0,0231	0,98	<0,001
3,5	4,3 ± 0,4	6,1 ± 1,5	7,4 ± 1,4	0,0226	0,94	<0,05

a. Mean ± SE

b. equation of the storage curve between 8 and 30 days of intoxication :

$\log A = \log A_8 + kt$ $\quad A_8$ = ppm in fish carcass at 8 days

A = ppm in fish carcass at t time

c. significance of the correlation coefficient estimated by the Student t test

The results indicate that DP6 was not metabolized in mullets. The DP6 ingested by the fish was stored in carcass according to a logarithmic curve independent of age. However, the DP6 concentration in carcass appeared higher in older fishes than in young fishes. This would indicate that PCB concentration in fish is dependent on food intake. Moreover, in wild environmental conditions the composition of the fish diet vary in relation to age (vegetable/animal ration in diet, for example). This can explain in part the increased PCB concentration as a function of age found in fishes caught in natural contamined aquatic biota. Nevertheless, this explication is not true in experimental conditions. Further investigation will be necessary to elucidate this problem.

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