FiskDir. Skr. Ser. HavUnders., 17: 499–500.

A NOTE ON THE PREDOMINANCE OF NON-K-REGION METABOLITES OF PHENANTHRENE FOUND IN BONY FISHES

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The metabolism of phenanthrene in marine organisms and rats has been intimately studied in our laboratory (Solbakken *et al.* 1980, Solbakken and Palmork 1981). We found a different main metabolite between bony fishes and cartilaginous fishes, crustaceans and mammals. The K-region metabolite, 9, 10-dihydro-9, 10-dihydroxyphenanthrene is previously found to be the main metabolite in mammals (e.g. Boyland and Wolf 1950, Chaturapit and Holder 1978). We also found the K-region metabolite most abundant in rats, crustaceans and cartilaginous fishes (Solbakken and Palmork 1981). However, in a study using coalfish, *Pollachius virens*, the non-K-region metabolite, 1,2-dihydro-1,2-dihydroxyphenanthrene was found to be the main metabolite (Solbakken *et al.* 1980) This is later on also reported in other experiments using rainbow trout, *Salmo gairdneri*, and flounder, *Platichthys flesus*, (Solbakken and Palmork 1981).

In an experiment to see if changes in dose, sampling time and temperature were due to the different pathway of the metabolism of phenanthrene, flounders and bluestriped grunts, *Haemulon sciurus*, were given phenanthrene intragastrically. The total weights were 143±33 and 444±113 g ($\bar{x}\pm SD$) of the flounders and the grunts, respectively. The method is previously described by Solbakken *et al.* (1980). Samples of urine and bile from six fish were combined and analysed for conjugated and hydroxylated metabolites by using gaschromatography-masspectrometry (see Solbakken *et al.* 1980). The temperature, the magnitude of the dose and the sampling times are given in Table 1.

The results show no variation in the main metabolite; the 1,2-dihydro-1,2-dihydroxyphenanthrene (non-K-region) was the main metabolite of phenanthrene in urine and bile. In all samples more than 98% of the metabolites were conjugated as sulfate or glucuronide conjugates, and the main metabolite represented more than 89% of the metabolites. The K-region metabolite,

Table 1. The experimental conditions.

Temperature °C	Dose (mg/fish) 25	5	0.5
	Sampling time (days after dosing)		
	Flounder *(Platichthys flesus)*		
0	*2,4*	–	–
4	*3*	–	–
9	1,2,7	2	2
	Grunts *(Haemulon sciurus)*		
25	2	–	–

9,10-dihydro-9,10-dihydroxyphenanthrene varied from 1 to 9% of the metabolites, and the 1-hydroxyphenanthrene from 0.1 to 0.9%. Only small amounts of the other metabolites were found.

These results show that the composition of metabolites is not affected by changes in dose, temperature and at which time after dosing the samples were analysed. It therefore seems likely that the difference in the main metabolites between bony fishes and cartilaginous fishes, crustaceans and mammals is due to genetic variations among the species.

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Received 15 June 1983
Printed 2 March 1984