

## **D-2.2.2 Studies on the movement of hazardous chemicals in the foodweb of benthic fauna**

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### **Abstract**

From our recent study, TPT and Co-PCBs in the coastal sediment seemed to be accumulated by benthic fish through foodweb. In the present study, bioaccumulation of chemicals in the offshore sediment through offshore benthic foodweb in Japan Sea was studied. While the concentrations of PCDDs, PCDFs and Co-PCBs in the offshore sediments of Yamato Bank were much lower than those of Hokuriku and San-In area, their concentrations in the benthic fauna were similar. TBT and TPT concentrations in the offshore sediments of Yamato Bank were similar with those of Hokuriku and San-In area. The concentrations of Co-PCBs and TPT in the benthic fish were higher among those of benthic fauna. These chemicals in the offshore sediment seemed to be accumulated through benthic foodweb.

**Key words** sediment, foodweb, bioaccumulation, dioxins, organotin compounds

### **1. Introduction**

Most of hazardous chemicals contaminate sediment persistently and are accumulated by benthic fauna through foodweb. In our last study, we studied on the bioaccumulation of dioxins and organotin compounds in the sediment through foodweb in the coastal area. In the last study, we concluded that dioxins and organotin compounds in the sediment, especially Co-PCBs and triphenyltin, were accumulated by benthic fauna through their foodweb.

Although the movement of hazardous chemicals in the coastal sediment was demonstrated, their movement in the offshore sediment are not known. In the present study, the movement of dioxins and organotin compounds in the foodweb of offshore area, Hokuriku and San-In area and Yamato Bank, were studied.

### **2. Study Area and analytical methods**

The study area are shown in Fig.1. The depth of study sites in Hokuriku and San-In area ranged from 200m to 500m and those of Yamato Bank ranged from 350m to 400m.

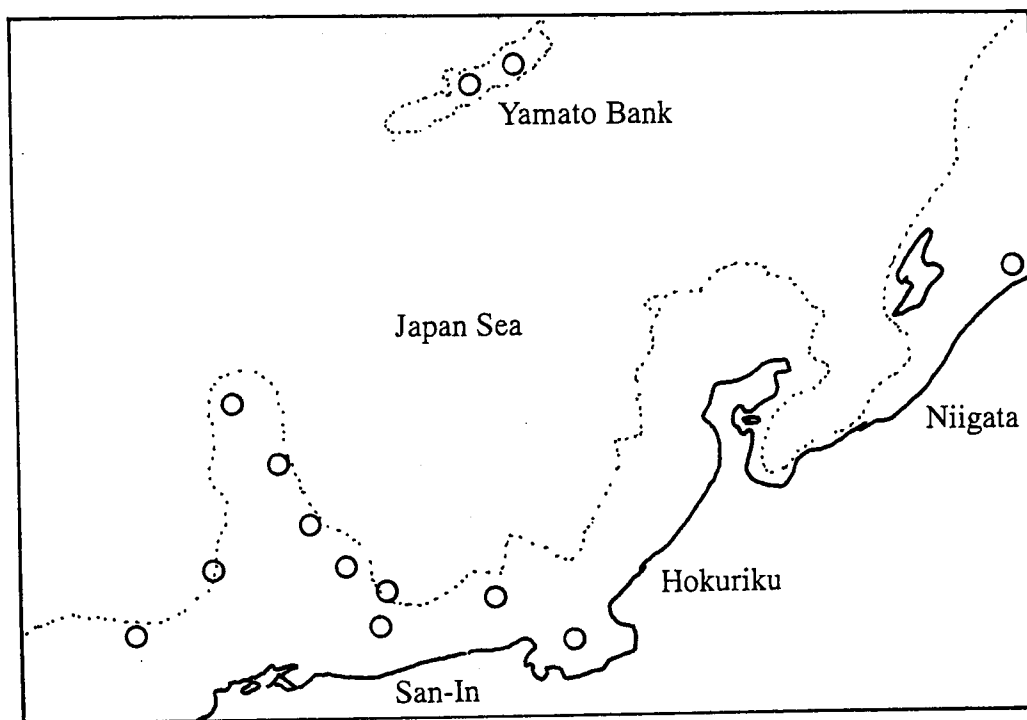


Fig.1 Study area

Open circles show the sampling stations. The dotted line shows 500 m depth.

The sediment and surface water were sampled at offshore of Niigata Prefecture, Wakasa Bay and Yamato Bank. The benthic fauna were sampled at offshore of Hokuriku and San-In area and Yamato Bank.

These samples were frozen at  $-20^{\circ}\text{C}$  just after sampling until analysis. Dioxins and organotin compounds in the sediment and organisms were analyzed by the methods of previous report.

### 3. The concentrations of dioxins and organotin compounds in the sediments and waters

The concentrations of dioxins and organotin compounds in the sediments and waters are shown in Table 1.

Table 1 The concentration of dioxins and organotin compounds in the sediments and surface waters of offshore area

	Niigata	Wakasa Bay	Yamato Bank
Surface water			
TBT (ng/l)	0.3-0.6	-	0.6-0.8
TPT (ng/l)	ND (<0.3)	-	ND
Sediment			
TBT (ng/g dry)	4-6	6-8	6-16
TPT (ng/g dry)	6-7	6-12	4-7
PCDDs (pg TEQs/g dry)	5.2-6.7	3.1	0.27-0.44
PCDFs (pg TEQs/g dry)	1.8-2.4	3.2	0.37-0.58
Co-PCBs (pg TEQs/g dry)	0.38-0.41	0.41	0.042-0.065

While the concentrations of organotin compounds in the sediments were not different among the stations, the concentrations of dioxins in the sediment of Yamato Bank were much lower than other stations. The compositions of dioxins were similar with one another among stations and the sources of them seemed to be herbicides (CNP and PCP) and PCB (Kanecrol).

#### 4. The concentrations of dioxins and organotin compounds

TBT concentrations of organisms sampled at Yamato Bank were similar with those of organisms sampled at Hokuriku and San-In area offshore. However, TPT concentrations of organisms at Yamato Bank were higher than those of organisms sampled at Hokuriku and San-In area offshore (Fig.2). In foodweb of Yamato Bank, TPT concentrations of benthic fish, decapod and Zuwai crab, which are predators of macro benthos, were higher than those of their preys (Fig.3). Although there was not significant relationship between organotin concentrations and ratio  $\delta^{15}\text{N}$  of organisms, TPT seems to be accumulated by benthic fish through the foodweb.

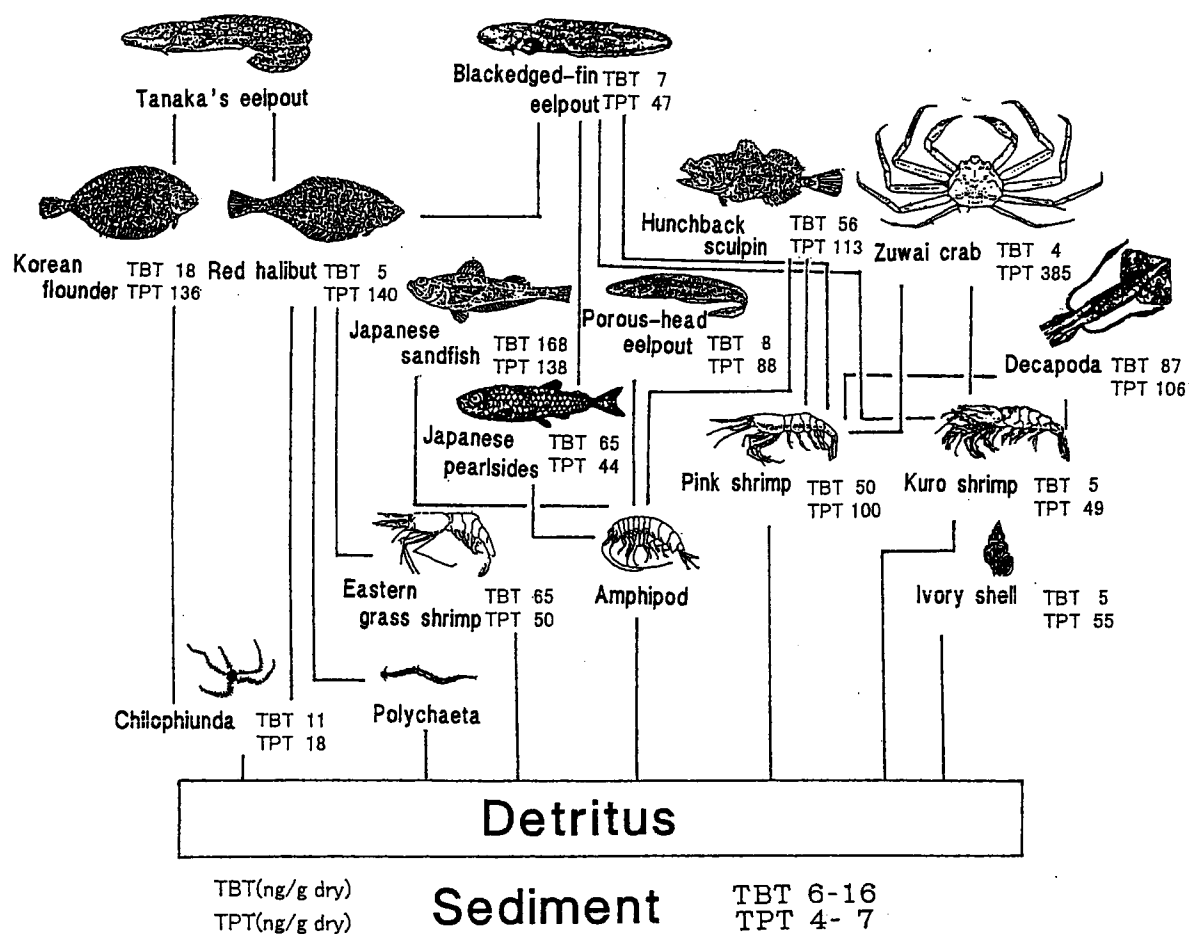
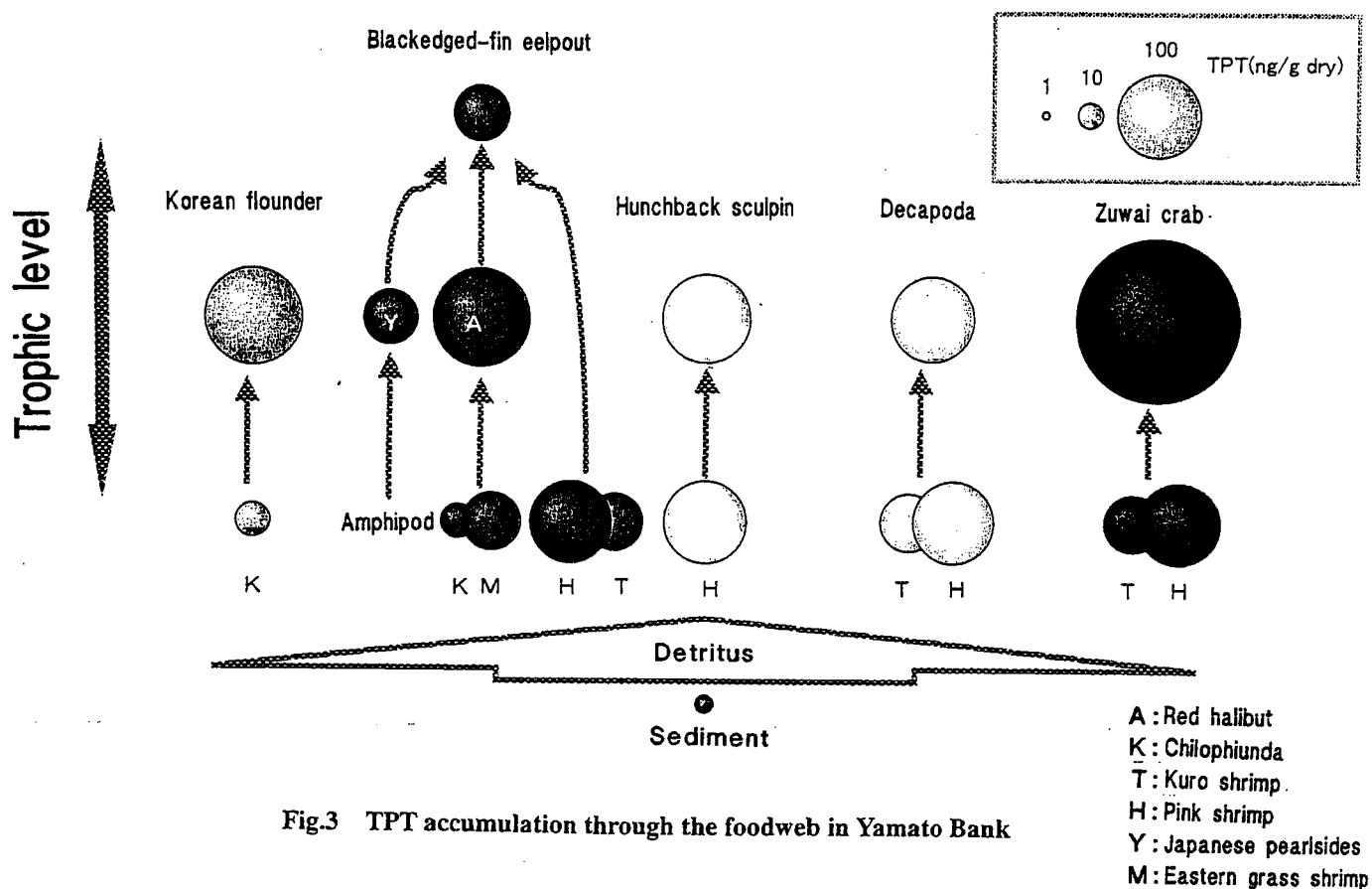


Fig.2 Organotin compounds concentrations of organisms and sediments in foodweb of Yamato Bank



### 5. The concentrations of dioxins in organisms

While dioxins concentrations of sediment of Yamato Bank was much lower than that of Hokuriku and San-In area, these of organisms were not different between these area (Fig.4). Concentrations of PCDDs, PCDFs and Co-PCBs of benthic fish and Zuwai crab were higher than those of macro benthos. Especially, Co-PCBs seem to be accumulated by benthic fish through the foodweb (Fig.5).

### 6. Conclusion

From our survey of coastal area, Nanao Bay, and offshore area, Yamato Bank and Hokuriku and San-In area, TPT and Co-PCBs seem to be accumulated by benthic fish through the benthic foodweb.

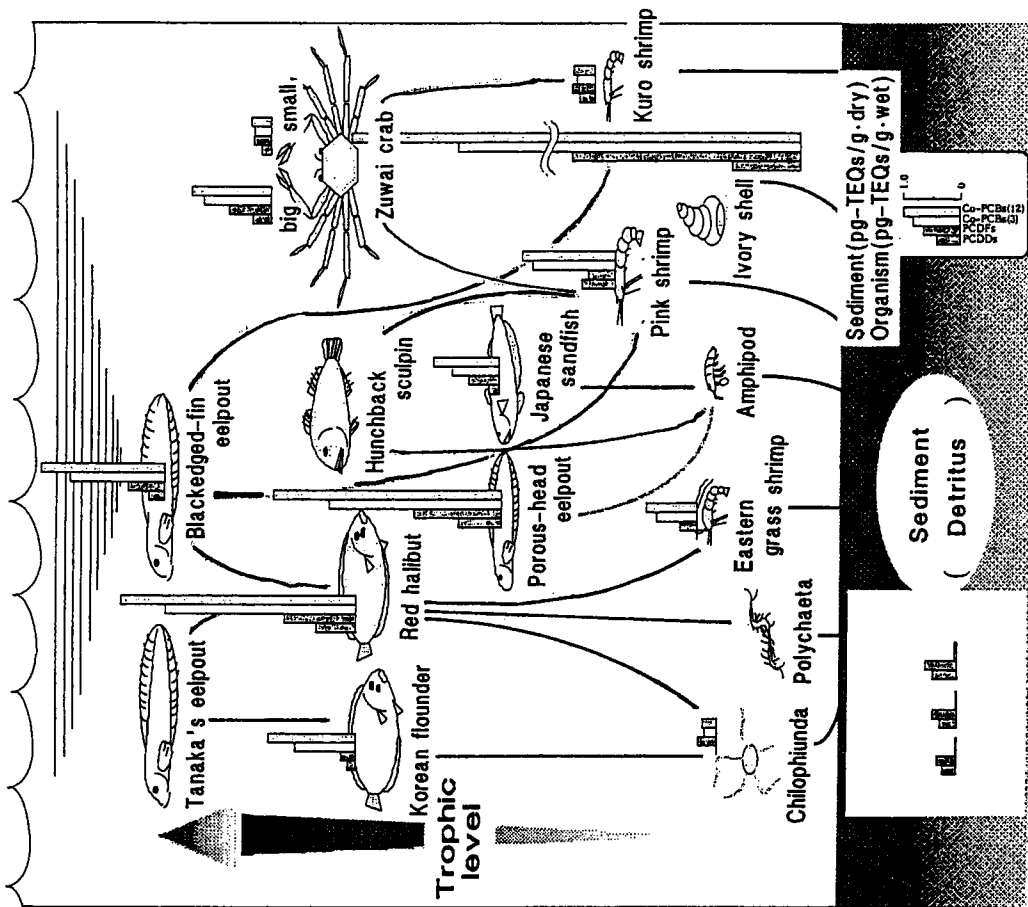


Fig.5 Dioxins accumulation through the foodweb in Yamato Bank

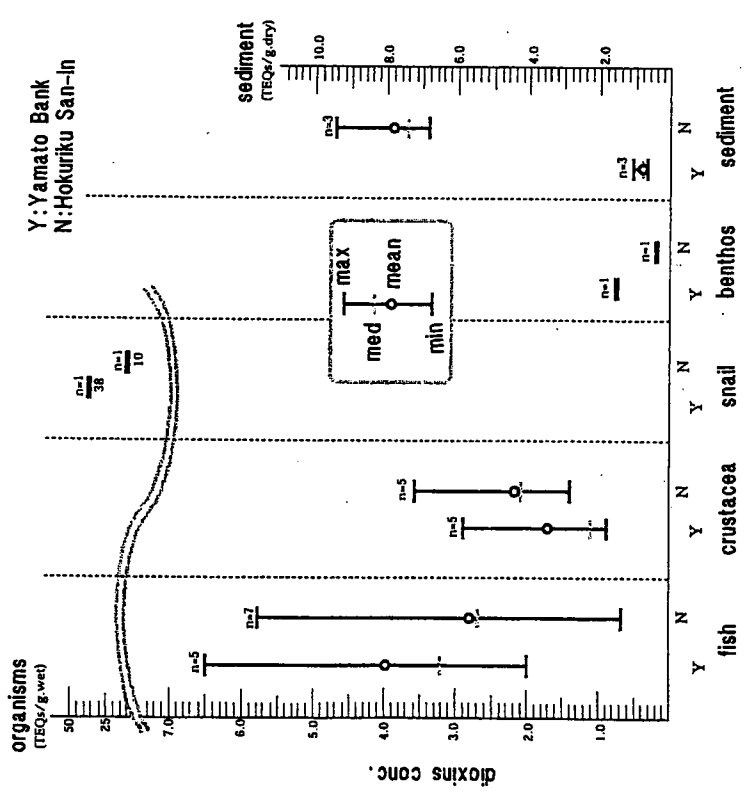


Fig.4 Dioxins concentrations of organisms and sediments in Yamato Bank and Hokuriku and San-In area offshore

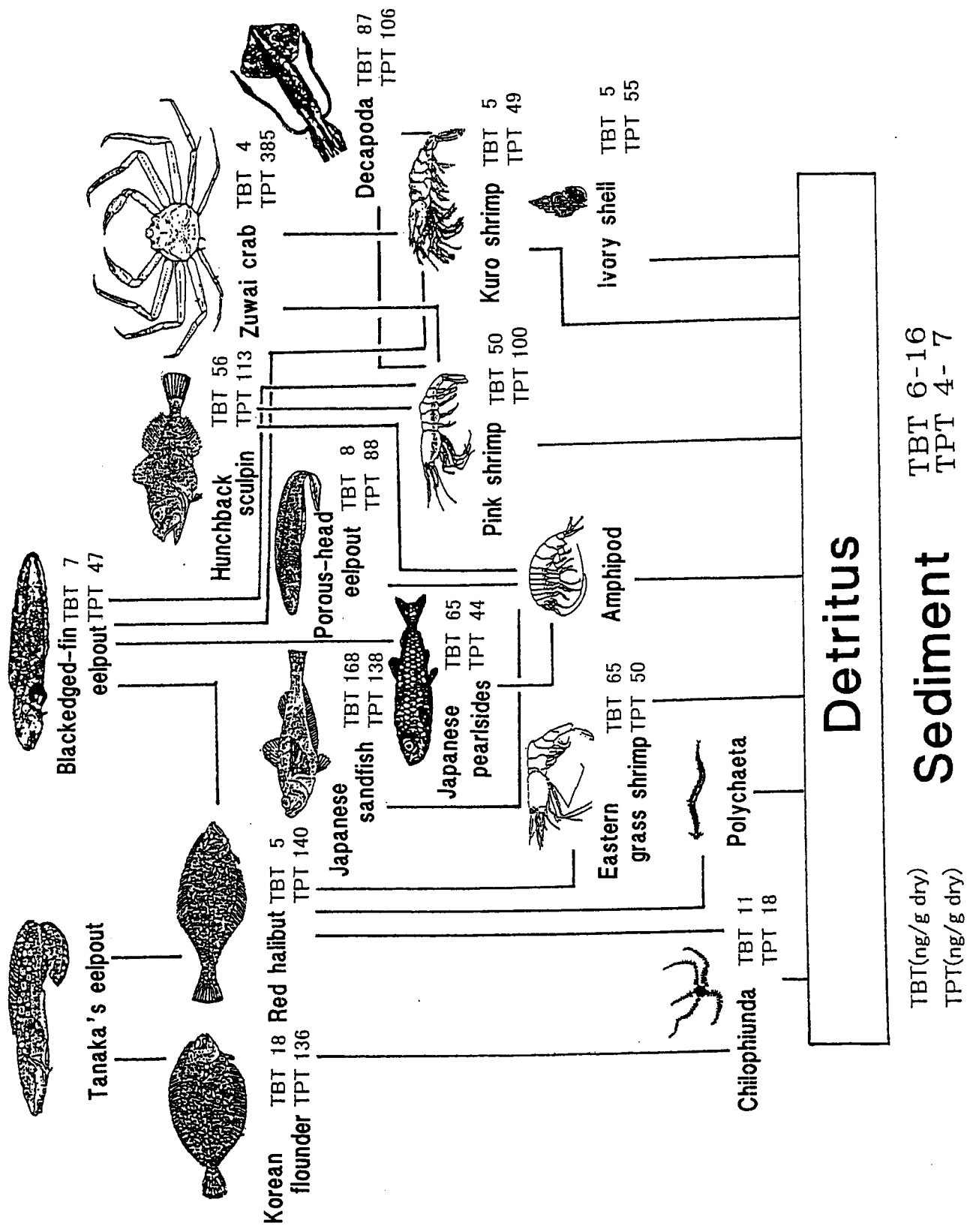


Fig.2 Organotin compounds concentrations of organisms and sediments in foodweb of Yamato Bank

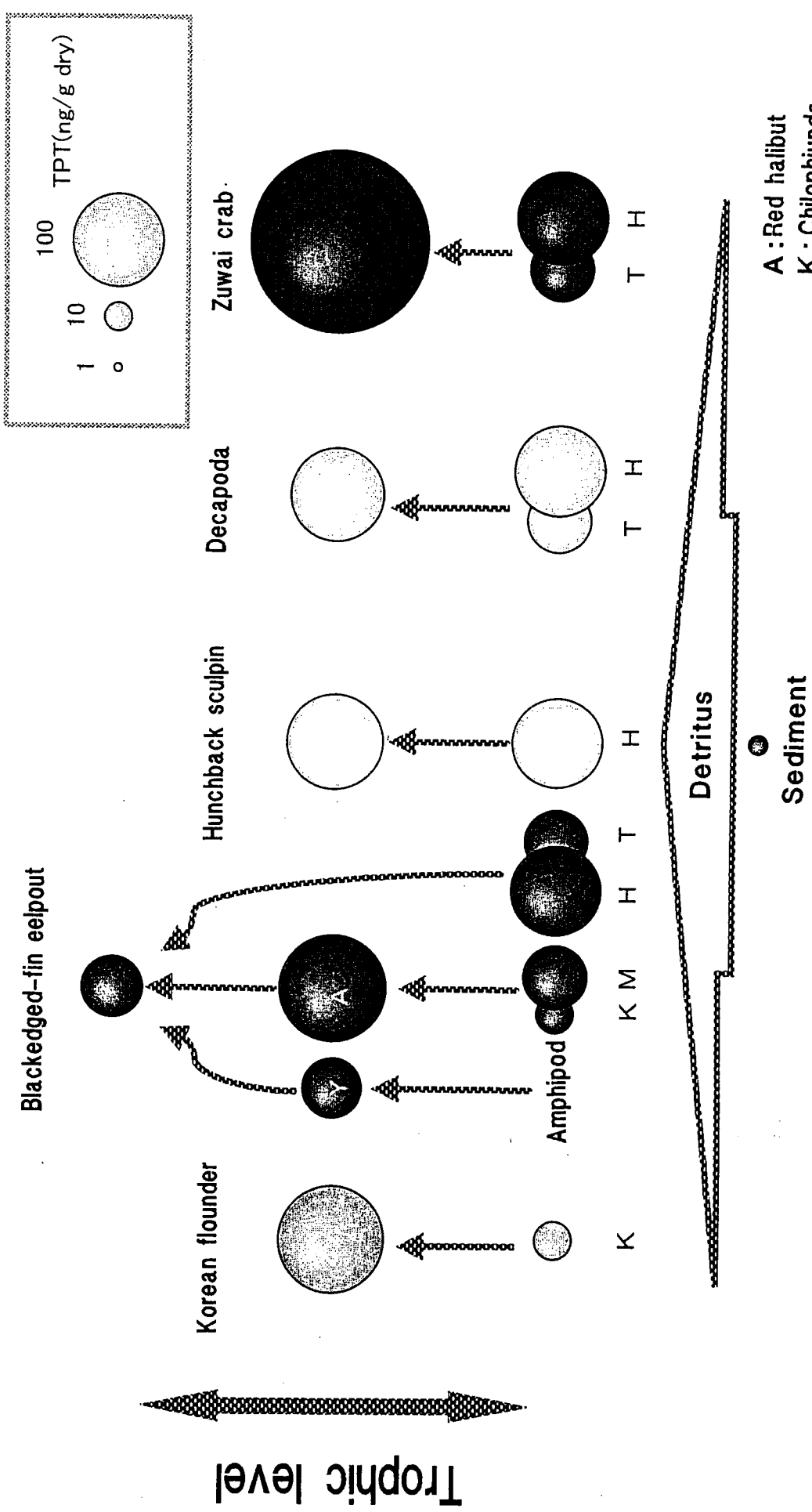


Fig.3 TPT accumulation through the foodweb in Yamato Bank

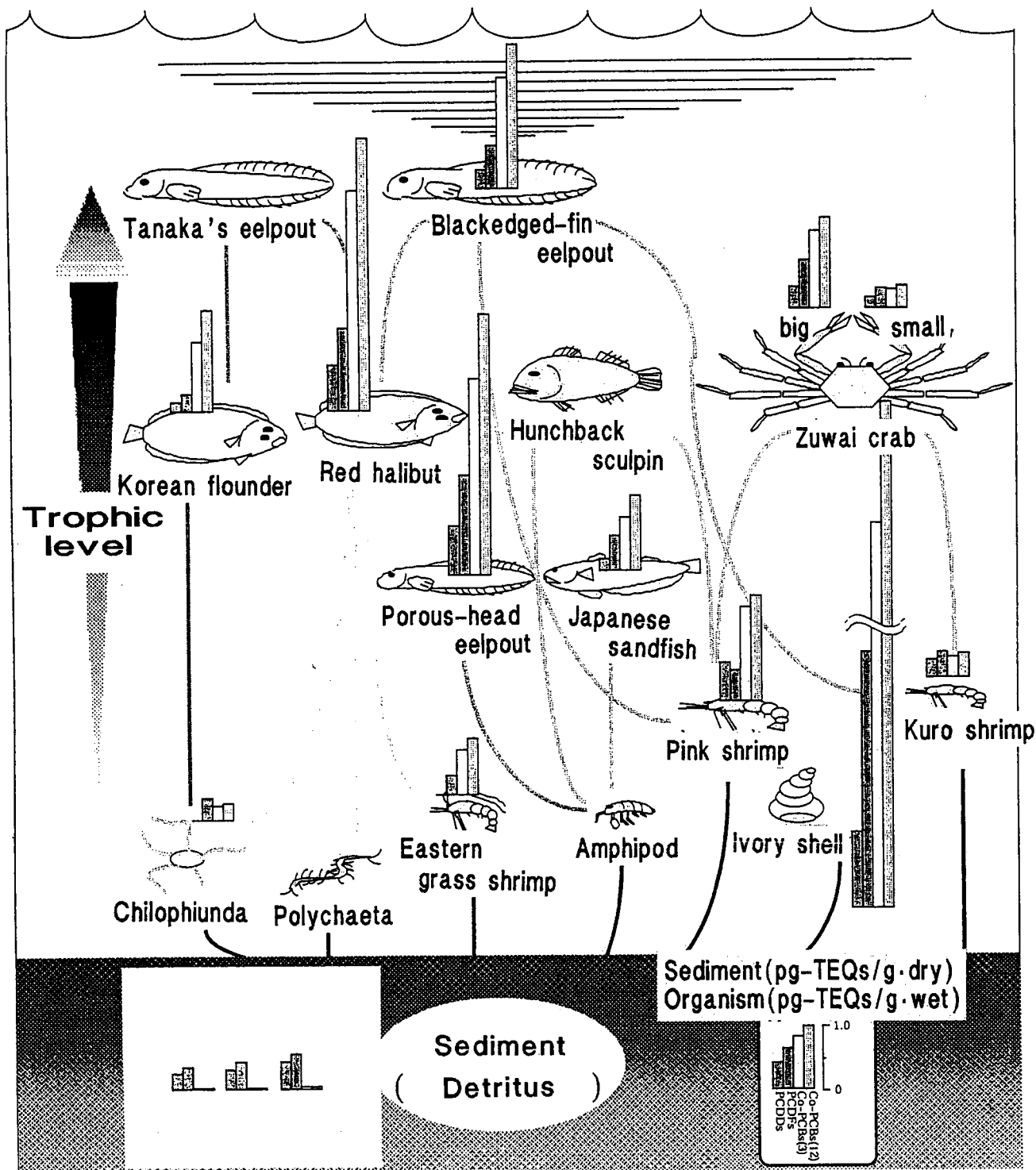
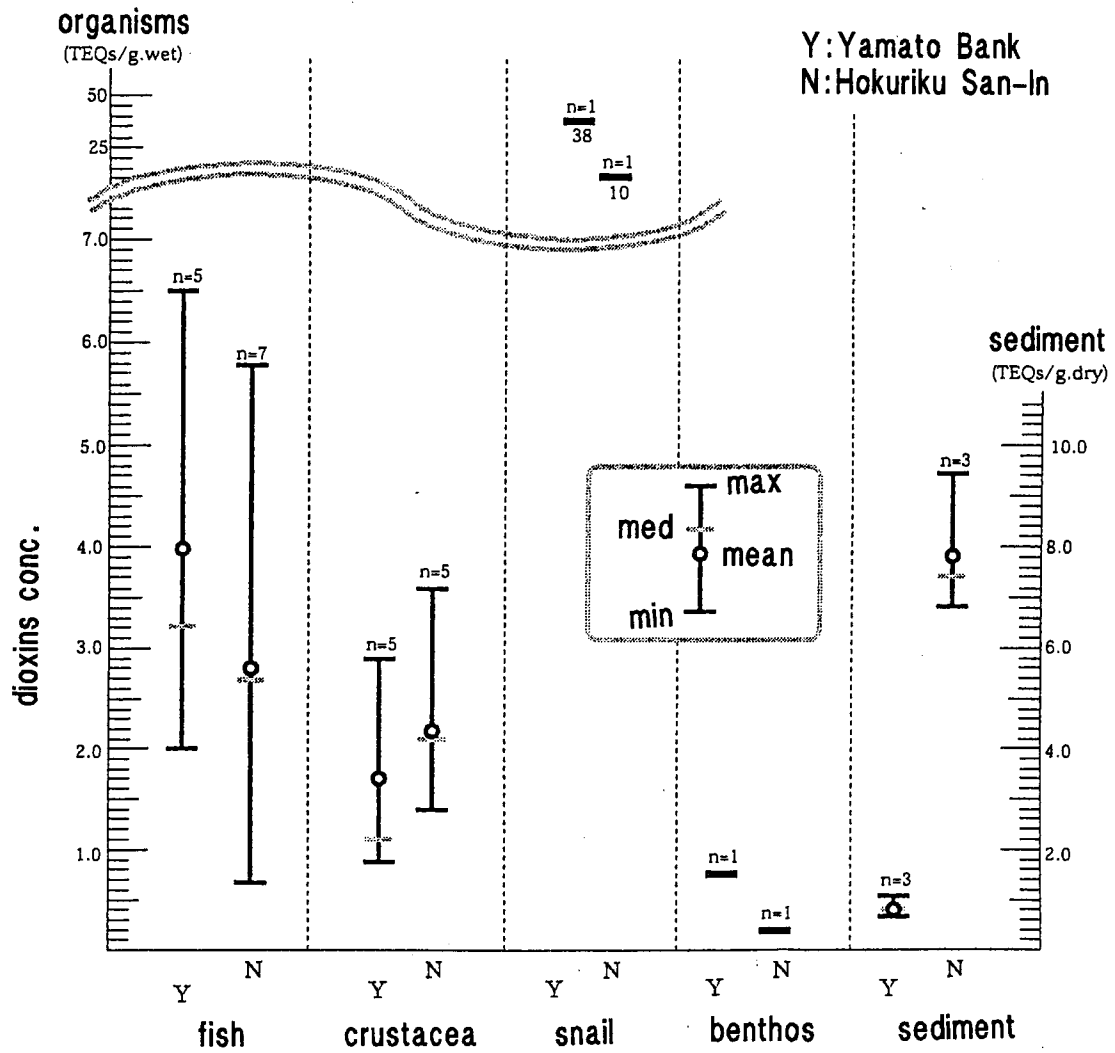


Fig.5 Dioxins accumulation through the foodweb in Yamato Bank





**Fig.4** Dioxins concentrations of organisms and sediments in Yamato Bank and Hokuriku and San-In area offshore