River, Niigata prefecture northern Japan, which located symmetrically against Otsuchi Bay in the river mouth direction. Miomete River flows into Japan sea and Otsuchi Bay is open toward the Pacific Ocean. Kubo (1938) concluded that the catch was influenced by snowfall and wind; a significant positive correlation between the catch and the amount of snow and "easterly" wind.

We can say that the fishermen's proverbs are worth believing.

Contamination and toxic impact of organochlorines and butyltins in mammals

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The present paper overviews the global contamination by persistent organochlorines and organotins, a representative group of endocrine disrupters, and their ecotoxicological implications on marine mammals.

The recent pattern of contamination by organochlorine residues in the coastal environment is prominent in tropical regions due to continuous usage in the low-latitude developing countries. The major emission source of organochlorines is probably located in the tropical belt and large quantities of volatilized contaminants are dispersed through the atmosphere of global terms. Reflecting this, a considerable contamination was observed in open ocean tropical waters as well as in the Arctic and nearby waters. The study of the mass transfer of organochlorines at the air-water interface suggests that the oceanic water bodies, particularly Arctic waters, act as a sink for persistent contaminants.

In this regard, the marine mammals, particularly cetaceans, are one of the animal groups receiving high concentrations of persistent organochlorines arising out of a worldwide contamination. They can amplify much greater amounts of toxic contaminants through feeding and also pass them in large quantities from one generation to the next through lactation. Unfortunately, these animals have a smaller capacity for degradation of these contaminants due to the specific mode of cytochrome P-450 enzyme systems. These drug-metabolizing enzyme systems may be related to the possible effects of persistent organochlorines, particularly coplanar PCBs. Furthermore, the residue levels of these contaminants in marine mammals are unlikely to decline in the near future.

Regarding organotin pollution, both cetaceans and pinnipeds showed the highest concentrations of butyltins (BTs) in the liver among various tissues and organs. In addition, noticeable high concentrations were found in the hair of pinnipeds, indicating possible excretion of BTs through shedding. BTs composition in mammals and their prey organisms suggested that pinnipeds have a stronger capacity to degrade BTs rather than cetacean. No age trend of BTs concentrations was observed in pinnipeds, while cetaceans showed increasing levels in immature growth stage. Comparing butyltin concentrations on various marine mammals, cetaceans retained higher butyltin concentrations than pinnipeds. The above specific accumulation patterns found in marine mammals are probably attributable to the lower breakdown capacity of BTs in cetaceans and the significant excretion of BTs through shedding in pinnipeds. Unlike organochlorines, comparable residue levels of butyltins were found in male and female of marine mammals. Such a trend suggested that butyltins are less transferable through gestation and lactation from mother to fetus/pup. On a global perspective of butyltin contamination in marine mammals, residue levels were found to be prominent in the coastal water of developed nations. The present contamination by BTs may pose a toxic threat to some coastal species of cetaceans.

Considering all these facts, it may be concluded that marine mammals are one of the most vulnerable and possible target organisms with regard to long-term toxicity of hazardous man made chemicals in the future.

Distribution, fates and effects of man-made organics in the aquatic environment

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I. *Distribution of selected man-made organics in the aquatic environments.*

We are surrounded by more than hundred thousands of man-made organics. Various species of wild animals as well as human are exposed to these chemicals. Field observations have been conducted about some organochlorine and organophosphorous compounds in the water of Western part of Japan including Lake Biwa, Yodo River basin, rivers in Osaka City and the harbor area of Osaka Port during these 20 years. The levels of organochlorines such as PCBs and HCHs in river water are decreasing year and year after the prohibition of application and use of these chemicals since 1972 in Japan. The concentration of PCBs and HCHs are less than 100 ng/L, generally. In place of these organochlorines,

organophosphate including pesticides and industrial chemicals such as organophosphoric acid triesters (OPEs) have been much applied and used recently. Rather high levels of organophosphorous pesticides in river water are noticed in summer because of their application. OPEs being used as flame retardants and plasticizers, however, are always detected in aquatic environments including rivers and estuary areas.

The uptake and accumulation of PCBs and HCHs by phyto- and zooplankton collected from the estuary area near Osaka Port were clearly noticed. Moreover, the seasonal change of organochlorine levels in net-plankton was almost the same as that in estuarine water. The concentration factors of organochlorines in net-plankton differed among the organochlorines. On the other hand, organophosphates were not detected in net-plankton, although these levels were clearly detected in the estuarine water.

It is well known that marine mammals such as whales, dolphins and seals accumulate high levels of organochlorines including PCBs, DDTs, HCHs in the subcutaneous fat. Striped dolphin (*Stenella coeruleoalba*) collected from Pacific coast of Japan also showed high concentration of PCBs, DDE and β-HCHs in the tissues of high lipid content such as blubber, melon, mammary gland, kidney and pancreas. We studied on the relationship between the lipid content, lipid composition and organochlorine levels in various organs or tissues of striped dolphin, and we concluded that the organochlorine levels in organs depended not only on the lipid content but on the lipid composition. For example, in blubber and melon, triglycerides comprise more than 90% of total lipid, and organochlorines were much accumulated in these tissues. On the other hand, brain tissues such as cerebrum and cerebellum showed rather low levels of organochlorines, although these tissues showed high lipid content. This is because of the low triglyceride and high phospholipid or cholesterol content in brain tissues.

II. *Fates and behavior of man-made organics in the aquatic environments.*

Fates of chemicals loaded to aquatic environments are important for the evaluation of toxicity to the aquatic organisms. Biodegradation of organics, especially degradation mostly contributes to the fates of chemicals. We studied on the degradation of some organophosphates including pesticides and OPEs by the bacteria in water and sediment. OPEs show the acute toxicity to fish in the same extent as organophosphorous pesticides, and some OPEs are known to show neurotoxicity and mutagenicity. Recently, OPEs are considered to be chemicals causing "Sick Building Syndrome". Tributyl phosphate and tricresyl phosphate degrading bacteria were isolated from river water, respectively.

Tributyltin (TBT) being used in antifouling paints shows high acute toxicity to the aquatic organisms such as fish, gastropods, crustaceans etc., furthermore, 'Imposex Phenomena' observed in marine gastropods were caused by TBT. We also isolated TBT degrading bacteria from the polluted river water in Osaka City.

The bacteria that degraded musty odor substances including geosmin and 2-methylisoborneol being produced by blue green algae and actinomycetes were also isolated from river water. These substances in drinking water cause uncomfortable problems in water supply, and the bacteria mentioned above have the possibility to utilize for the musty odor treatment processes.

III. *Evaluation of toxicity of man-made organics using cultured cells.*

Established cell lines including HeLa cells, MA (monkey kidney) cells and Intestine 407 (human fetal intestine) cells were used for the evaluation of the toxicities of selected organophosphates and organotins. Among organophosphates mentioned above, TCP shoed the highest cell toxicity. River water extracts with XAD-2 resin were also assayed using cultured cells, and the comprehensive evaluation of river water quality concerning man-made organics was possible.

Bioaccumulation and biological impact of TBT on *Caprella* (Crustacea: Amphipoda)

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The release of EDCs (Endocrine Disruptor Compounds) in the marine environment has been found of great concern due to the deleterious effects on a wide range of aquatic organisms. Toxic anti-fouling paints containing TBT (tributyltin), one of the EDCs, are highly controversial topic in the marine environment, since TBT based paint has become the most popular technology owed to their strong effect. Although Japan as well as in other developed countries in the early 1990's placed restrictions on the usage of TBT as an anti-fouling agent for coastal boats and aquaculture beds, levels of BTs (butyltin compounds) in the marine environment remain at high even at now.

We have conducted a comparative study on the levels of BTs including TBT and its breakdown products DBT (dibutyltin) and MBT (monobutyltin) in seawater, sediment, and organisms at various trophic levels in the food web in the marine ecosystem, with special reference to *Caprella* spp. (Crustacea: Amphipoda), along Sanriku coast, northern Japan.

Characteristics of *Caprella* spp. are,

1) High species diversity in North East Asian coasts.
2) Small crustacean in 1 to 5 cm of body length.
3) Well-adapted morphology for clinging to substrata such as