Brief Research Report

PRELIMINARY EVIDENCE FOR IN VITRO METHYLATION OF TRIBUTYLTIN IN A MARINE SEDIMENT*

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Organotin compounds, especially tributyltin (TBT), are found in sea-water and sediment samples from the principal commercial harbours in Malta. TBT, and to a lesser extend its degradation products, *i.e.* dibutyltin and monobutyltin, have been shown to produce harmful effects in a variety of marine biota. Recent reports from our laboratory on the occurrence of methylbutyltins in marine sediments and seawater suggest that these compounds are formed in the environment by the methylation of both TBT and that of its degradation products, to give $Me_nBu_{(4-n)}Sn$ for which n = 1, 2 and 3 respectively.

We investigated the possibility of inducing methylation of TBT in seawater-sediment mixtures in experiments carried out *in vitro* using environmental materials collected from a yacht marina in Msida, Malta. Three water-sediment mixtures, which were shown to contain TBT, dibutyltin and monobutyltin but no other organotins, were spiked with tributyltin chloride (90 mg in 100 mL sea-water/100 ml sediment); to one mixture was added sodium acetate and to another methanol, to act as possible additional carbon sources, and all mixtures were allowed to stand at 25°C in stoppered clear-glass bottles in diffused light for a maximum of 315 days. Speciation and quantification of organotins was performed using aqueous phase boroethylation with simultaneous solvent extraction followed by gas chromatography with flame photometric detection. The atmosphere inside the bottles quickly became reducing with abundant presence of H_2S, and after an induction period of about 112 days, and only in the reaction mixture containing methanol, methyltributyltin ($MeBu_3Sn$) was observed in both sediment (maximum concentration 0.87 μgSn g^{-1}) and overlying water (maximum concentration 6.0 μgSn L^{-1}). The minimum conversion yield of TBT into $MeBu_3Sn$ was estimated to be 0.3%. $MeBu_3Sn$ has a significantly lower affinity for sediment than TBT and, therefore, is more mobile in the marine environment, possibly also migrating into the atmosphere to generate a hitherto unsuspected flux of organotin compounds into that phase.

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