Inhibitory effect of sediment pollution on Baltic amphipod *Monoporeia affinis*

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Introduction: Sediments represent an important component of marine ecosystems in recycling of nutrients and toxic substances. Frequently sediments are overloaded with contaminants, causing serious threat to coastal ecosystems, sustainability of natural resources and human health. Toxicity testing offield - collected sediments is an accepted method for evaluating the risk caused by contaminated sediments to aquatic organisms. Animals living in marine sediments play a major role in global biogeochemical cycling. Sediment-living and deposit-feeding amphipods are used for ecotoxicological studies to determine pollution of sediments. The most productive and abundant macrofauna species of the Baltic Sea soft bottoms is *Monoporeia affinis*, which is recommended [1] as test organism for sediment toxicity detection.
The aim of this study was to detect the potential toxicity of the Baltic Sea sediments using acute biotest with amphipods *M. affinis*.

Methods: Sediments samples were collected from different Baltic Sea regions - Gulf of Riga (23 stations), Gulf of Finland (17 stations), Gulf of Bothnia (6 stations) and Gulf of Gdansk (4 stations). Sample collection was performed from the surface layers, using a bottom sampler - 0.1 m^2 Van Veen grab.
Sampling of deep-water amphipods *M. affinis* (living in muddy sediments) was performed in NW part of the Gulf of Riga and acclimated under natural conditions until performance of reference tests and bioassays. Tests with reference toxicants showed high sensitivity of testobjects (Table. 1).

Table. 1: The water-only reference toxicant test, LC_{50} after 96-hour exposure

Reference toxicant	*Monoporeia affinis*
$CdCl_2$	3,59 - 4,86 Cd^{2+} mg/L
$CuSO_4$	10,28 - 16,08 Cu^{2+} mg/L
Fluoranthen	13,32 $C_{16}H_{10}$ mg/L
NH_4Cl	83,95 - 90,33 NH_4^+ mg/L

Sediment toxicity was determined using ISO 16712:2005 standard method. Whole sediment toxicity test and fractional test with fine sediment fraction (<40 mm) was performed. The dissolved oxygen concentration, temperature, salinity, and pH were measured at the beginning and at the end of each experiment. The numbers of swimming and dead organisms were observed daily. After 10 days of exposure sediment were sieved through the 0.5 mm sieve. Test organisms were transferred in a separate container and number of living and dead individuals was determined.

Results and Discussion: Whole sediment bioassays didn't show any toxicity of tested sediments of the Gulf of Riga, Gulf of Gdansk and Gulf of Bothnia. Survival of deep-water amphipods *M. affinis* at the presence of tested sediments was above 80% and reburrowing capability of *M. affinis* was relatively high. Most of sediment samples from the Gulf of Finland were non-toxic as well. Nevertheless inhibitory effect (mortality 40 – 65 %) was observed in three stations of the open part of the Gulf of Finland. Bioassays with fine sediment fraction (<40 µm) showed similar results.
In general Baltic Sea sediments were considered to be non toxic to the deep-water amphipods *M. affinis*. Results of ecotoxicological experiments were compared with pollution analyses of sediments.

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References: [1] ISO 16712:2005 „Water quality - Determination of acute toxicity of marine or estuarine sediment to amphipods".