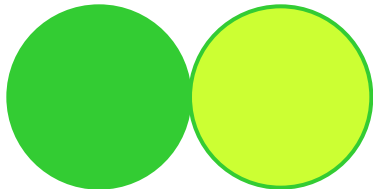
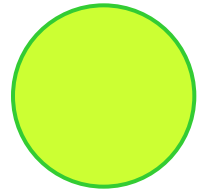


Toxicity characterization of road dust and urban river sediments using bioassay with ostracod



SCRWS 2009 in Bali

Feb 23, 2009

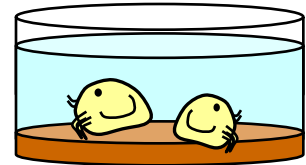
Dep. of Urban Engineering, Graduate School of
Engineering, The University of Tokyo

Candidate of PhD(D1) Haruna Watanabe

Background (1) Sediment toxicity assessment

- Need to evaluate an impact of contaminated sediment to aquatic ecosystem

- Use of Bioassay (whole-sediment toxicity tests with benthos)

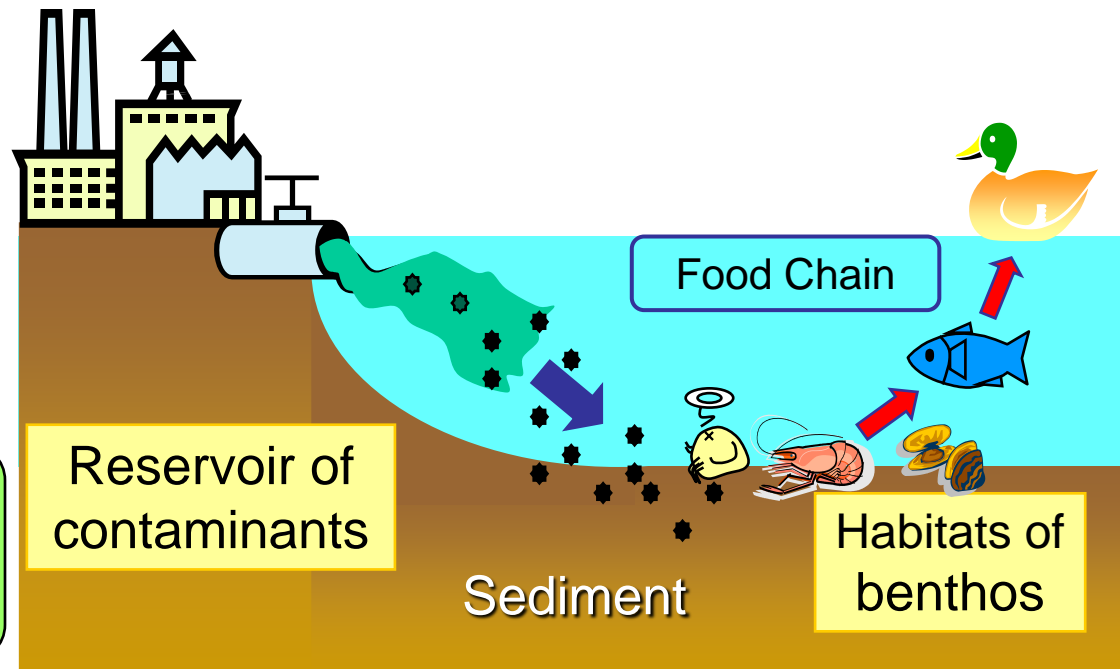


- What are the chemical compounds responsible for the toxicity ?

- Effective remediation
 - Sediment quality guideline

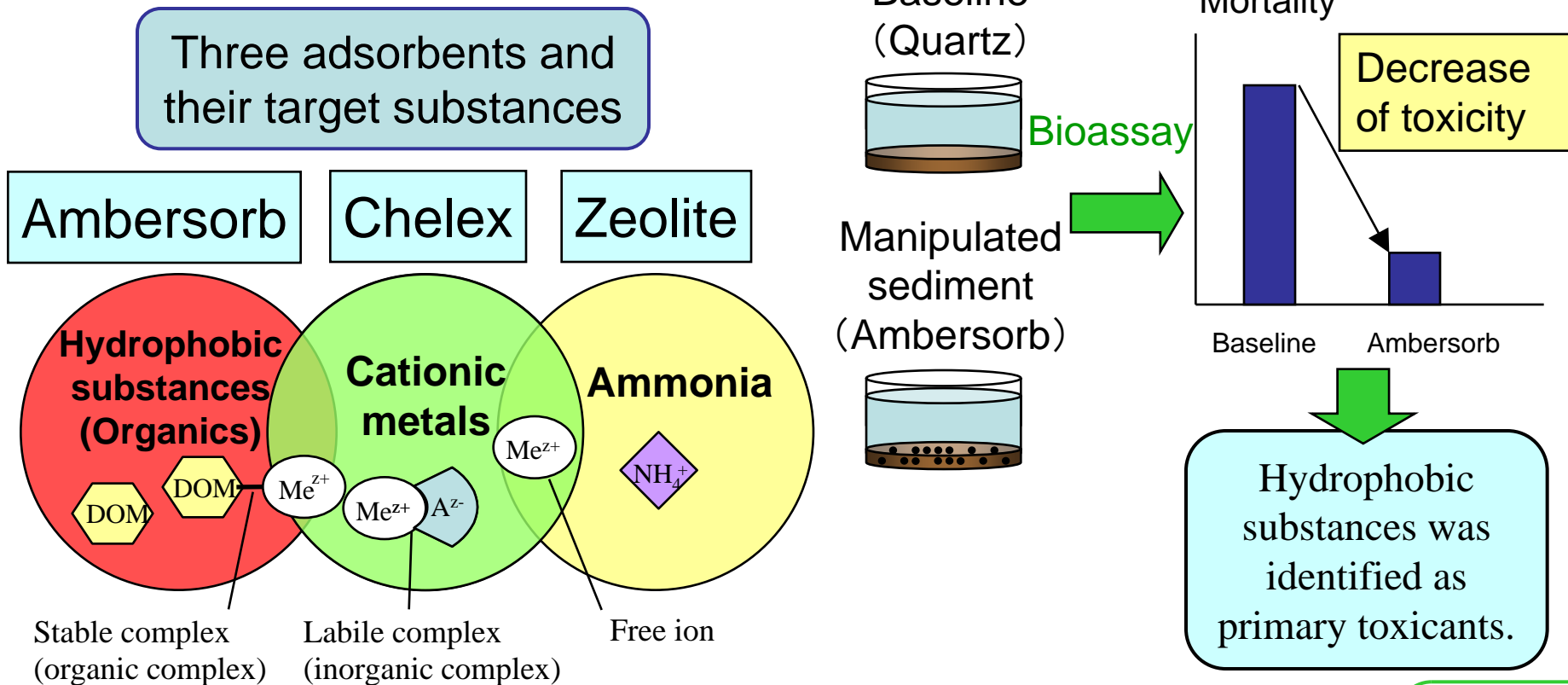


Toxicity Identification Evaluation (TIE)



Whole-sediment Toxicity Identification Evaluation

- US-EPA had developed procedures of whole-sediment TIE to identify the cause of toxicity in sediments.
- Combine bioassay and physical/chemical manipulation of samples to remove specific groups of toxicants.



Objective & Samples

Try to identify the principal toxicants of road dust and urban river sediments in Tokyo, applying whole-sediment TIE methods to the bioassay with ostracod.

Road Dust

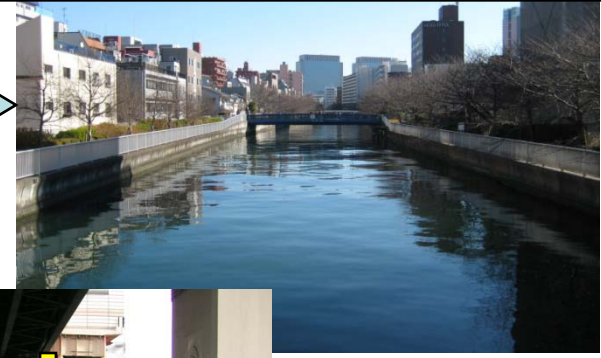
Non-point source of pollution

Urban River Sediment



Fine particles collected on the surface of road

Runoff



Direct inflow of road runoff



Methods: Bioassay and TIE methods

Bioassay: Ostracodtoxit

- Test Organism: *Heterocypris incongruens*-Crustaceans
-Benthic Ostracod

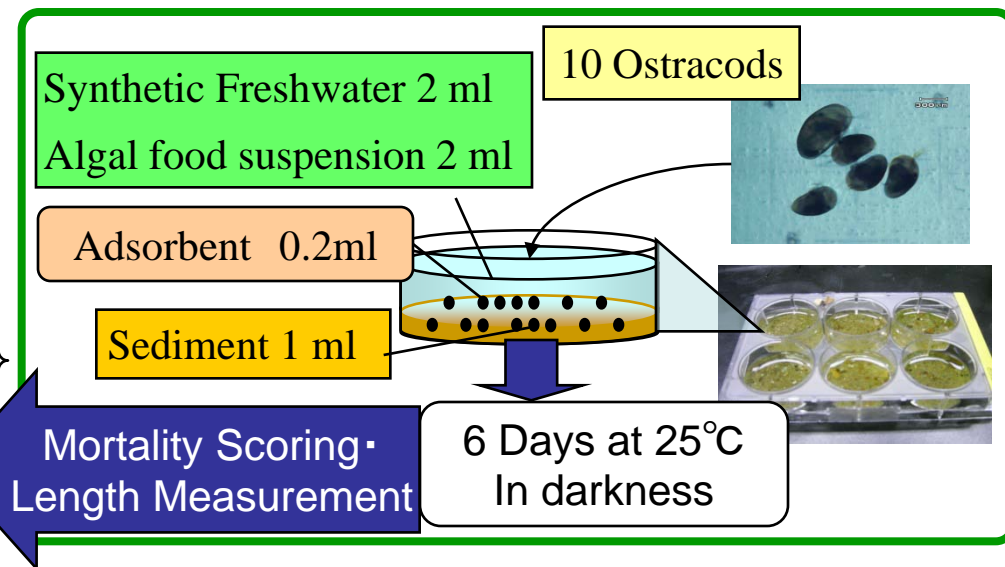


• Toxicity Indexes

- Mortality (%) = $\text{Dead} / \text{Total} \times 100$

- Growth Inhibition (%)

$$= \left\{ 1 - \frac{\text{Length increment of sample}}{\text{Length increment of reference sediment}} \right\} \times 100$$



TIE methods

- Mix 20% (v/v) of each adsorbents and quartz (for Baseline) with samples and test water.
- After 6~24h (Road dust: 6h, Sediment: 24h), add algal suspension and start the bioassay.

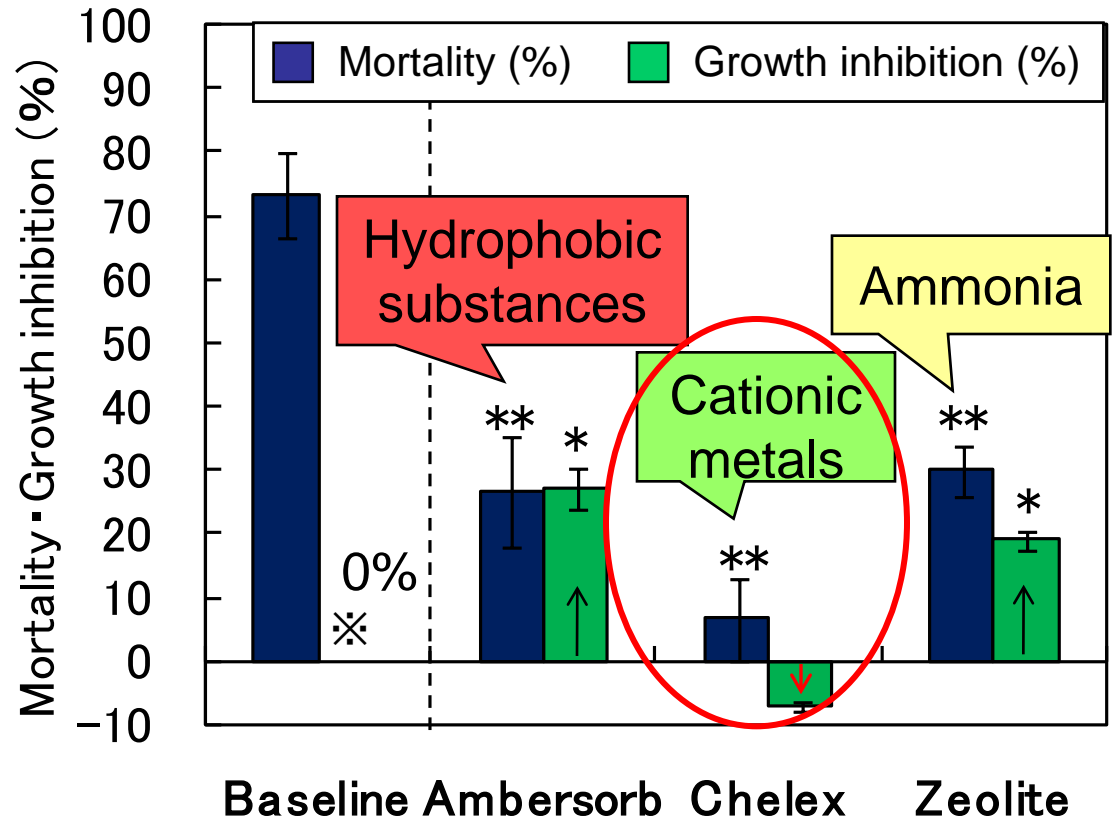
Results(1) Road Dust

- All of three adsorbents could reduced the mortality → All of target chemicals might be the toxicants?
- Unionized ammonia < toxic levels to the ostracod → ammonia might not be the primary toxicant.
- Growth inhibition was only reduced by the addition of Chelex



Cationic metals were the major causes of road dust

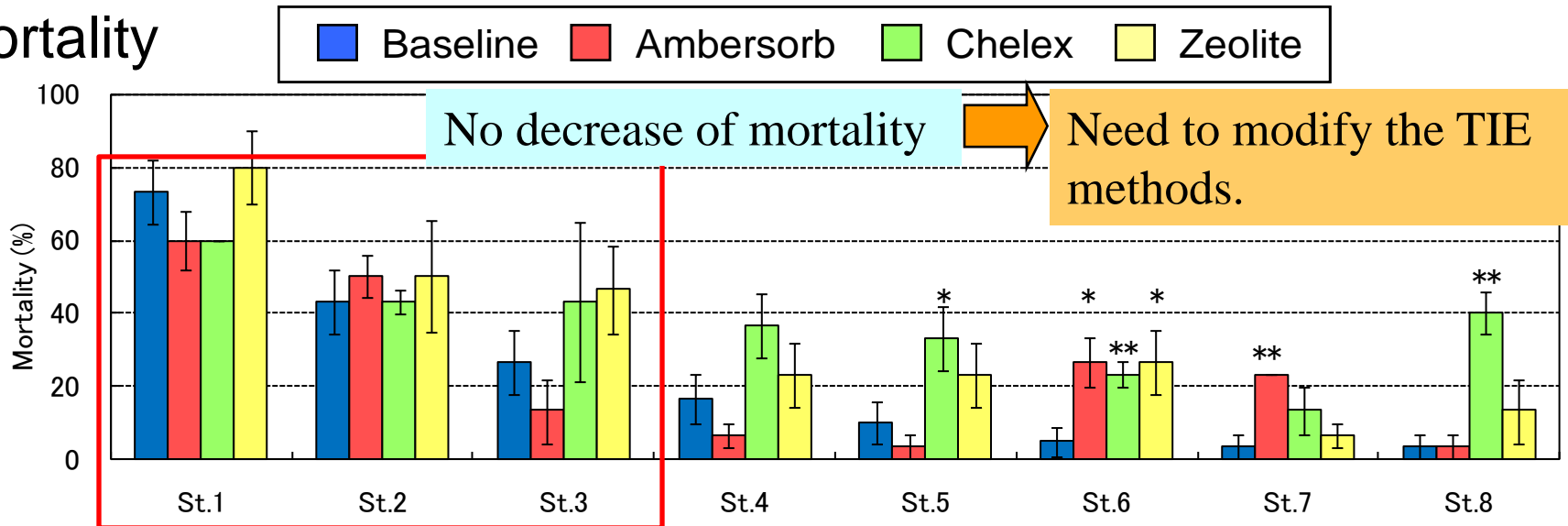
※Growth inhibition was determined by the length increment in comparison to the results of.



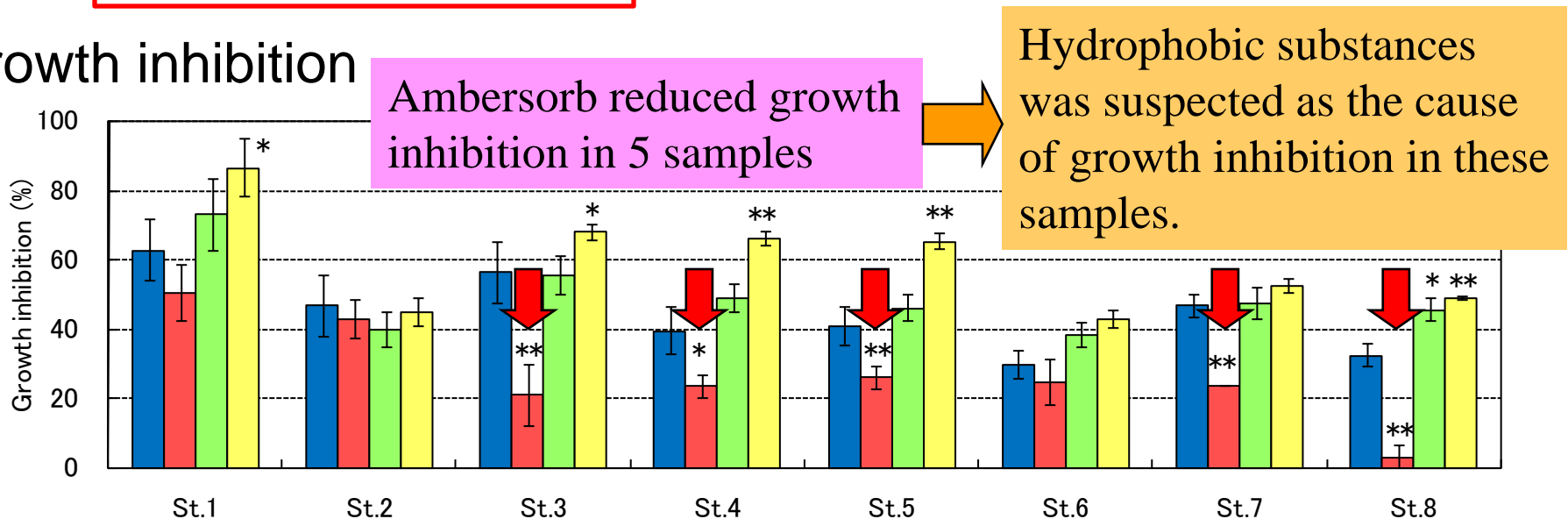
Mean ± S.E. (n=3). * and ** indicate significant difference between adsorbents treatment and Baseline (*t* test, *: $p < 0.05$, **: $p < 0.01$).

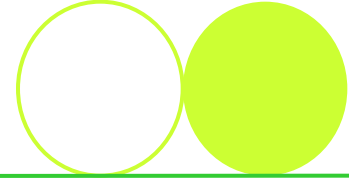
Results(2) Urban river sediments

Mortality



Growth inhibition





- Cationic metals were identified as the primary toxicants of road dust.
- Hydrophobic substances were suspected as the cause of the growth inhibition in five sediment samples.
- To identify the cause of mortality in some sediments, we need to modify the TIE methods of guidelines.

Thank you for your attention!

