inhibited ($p < 0.05$) at ≥1.24 mg POEA/L. However, there was no significant difference in oviposition across treatments subsequent to snails being transferred to water that did not contain POEA.

WP195 Effect of narcotics on membrane-bound mitochondrial processes in fish

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Around 70% of industrial chemicals are hydrophobic compounds which are assumed to elicit toxicity through narcosis by accumulating in membranes and disrupting membrane integrity and function. Although narcosis has been recognized as an important toxicity mechanism for decades, ecotoxicological research has been mostly limited to the development of quantitative structure activity relations (QSARs) to predict toxicity, resulting in insufficient understanding of the exact mechanisms involved. In this study we investigate specific aspects of the mechanism of narcosis in fish using both alternative in vivo (zebrafish embryo) and in vitro tests. We applied a passive dosing method to expose zebrafish embryos up to 5 days post fertilization to linear dilution series of a set of non-polar narcotics (phenanthrene and three chlorobenzene structure analogues). In addition to increasing mortality, we observed decreasing growth, heart rate and motility with increasing exposure concentration of all narcotics, consistent with the general assumption of reduced cardiorespiratory function. At the cellular level, the cell membrane is expected to be the first target of narcotics. Since the mitochondrial and endoplasmic reticulum membrane are known to closely interact with the cell membrane, we hypothesize that narcotics can be further partitioned into these organelle membranes where they can disrupt essential membrane-bound processes. The electron transport chain (ETC) is an example of a crucial mitochondrial membrane-bound process and is therefore a potential target. We found that in zebrafish embryos ETC activity was increased at low exposure concentrations, suggesting a compensatory response, while it decreased when exposure concentrations reached levels causing reduced motility, heart rate and eventually mortality. The effect of narcotic compounds on ETC activity was confirmed in vitro: we observed inhibition of the ETC after adding the compounds directly to a homogenate of control embryos. To further investigate effects on the energy production system, and to characterize the observed compensatory response, we are currently measuring the effect of narcotics on ATP synthase activity both in vivo and directly in vitro. Although narcosis is commonly considered a non-specific mechanism of toxicity acting by membrane disruption in general, we illustrate how we can increase our understanding of narcosis by focussing on specific membrane types and membrane-bound processes.

WP196 Estimation of Site-specific PAH Leaching from Creosote Treated Piles in the Aquatic Environment

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Creosote treated piles in marine and freshwater may leach chemicals including polycyclic aromatic hydrocarbons (PAH) into the aquatic environment. Estimating the rate of PAH leaching from creosote-treated piles is relevant for informing decision makers of the magnitude of potential for the introduction of PAHs to the aquatic environment, including the sediment, where creosote-treated piles are located. The available information suggests that multiple site-specific factors, including pile age, pile dimensions, and ambient salinity and temperature may substantially affect PAH leaching rates. The rates are considered to decline with piling age, increased salinity and decreased temperature. Accounting for these factors is therefore central for estimating a PAH-leaching rate reflective of site-specific conditions. This work presents a method for estimating site-specific leaching rates using the PAH-migration equation from the K.M Brooks (1997) model and measured and estimated input parameters. An average annual per-pile leaching rate, in units of kg PAH/pile/year was calculated for an example riverine site in Washington State. The estimated rate incorporates monthly variations in temperature and salinity and accounts for pile dimensions and increasing age. Publicly available water quality data was used to parameterize salinity and temperature inputs and average in-water pile length was estimated using site dock and pile information and GIS and bathymetric and LIDAR data. This example with a discussion of uncertainty will demonstrate step-wise how to conservatively parameterize the adopted model to estimate a site-specific PAH leaching rate, dependent on local water quality conditions and pile dimension and age.

WP197 Evaluating the toxicity of perfluoroalkyl sulfonates (PFASs) to a sensitive invertebrate, the mosquito *Aedes aegypti*

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Perfluorinated compounds such as perfluorooctane sulfonate (PFOS) and perfluorohexane sulfonate (PFHxS) often occur together in the environment and may pose a risk to ecological systems. Perfluorooctane sulfonate was used as a flame retardant until it was voluntarily phased out by the manufacturer in the early 2000's although it is still commonly measured in water bodies. It is listed as a contaminant of emerging concern due to its persistence and potential toxicity. The most sensitive species to PFOS is a dipteran, *Chironomus tentans*. To examine toxicity in another dipteran we tested a number of key life cycle endpoints in the yellow fever mosquito, *Aedes aegypti*. Four-hundred and twenty newly hatched (first instar) mosquitoes were exposed to PFOS continuously until emergence at one of seven concentrations ranging from 0 to 2000 µg/L. We observed no significant effects for any of our endpoints at our lowest exposure level, 50 µg/L, but saw many significant changes at the next highest exposure level, 125 µg/L. For instance, PFOS concentrations of 125 µg/L or greater significantly reduced survival when compared with the control (0 µg/L). Perfluorooctane sulfonate exposure also significantly decreased time to emergence for exposure concentrations above 50 µg/L. Mosquito mass at emergence for all concentrations was positively correlated with time to emergence and mass at emergence correlates with total adult fecundity. Therefore, mosquito fecundity should be reduced following exposure to PFOS concentrations at or above 125 µg/L. Although not as sensitive to PFOS as *C. tentans*, *A. aegypti* is among the more sensitive aquatic species tested. This study provides additional evidence that insects may be particularly sensitive to PFOS. Importantly, our field sampling has shown that PFOS often occurs within a mixture of PFASs. One of those, PFHxS, was measured at concentrations up to 5000 µg/L and at a ratio of approximately 2.5:1 PFHxS:PFOS. To better understand potential risks of PFASs, it is important to test the toxicity of PFHxS to sensitive organisms such as *A. aegypti* with and without the inclusion of PFOS and other PFASs. Additional studies will focus on exploring the toxicity of common PFAS mixtures using the *A. aegypti* model.

WP198 Fluoranthene and Ultra Violet light DNA damage and repair in *Artemia franciscana*

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Polycyclic aromatic hydrocarbons are a group of substances with a wide environmental distribution; they can cause oxidative stress and DNA damage. The risk of these effects increases when exposure is combined with solar UV radiation. The objective of the present work was to evaluate DNA damage and repair in *Artemia franciscana* exposed to fluoranthene. Metanauplii of *A. franciscana* were used in a sublethal test where DNA damage was evaluated with the single gel electrophoresis method (comet assay). Two concentrations of fluoranthene were tested (24 and 48 µg/L) with 8 replicates of 100 organisms each. Two controls were prepared: one with sea water only, and another one with acetone.