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Dai, Lina; Selck, Henriette; Salvito, Daniel ; Forbes, Valery E.

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Fate and effects of fragrance material on the deposit feeder, *Capitella teleta*

Lina Dai[1], Henriette Selck[1], Dan Salvito[2] and Valery E Forbes[1,3]
[1]Roskilde University, DK-4000 Roskilde, Denmark
[2]Research Inst. for Fragrance Materials, Woodcliff Lake, NJ
[3]School of Biological Sciences, University of Nebraska Lincoln, LN
E-mail contact: ldai@ruc.dk

Introduction

Fragrance materials (FMs) have been used ubiquitously in perfume, cosmetics, detergents etc. The primary pathway of FMs into the aquatic environment is via down-the-drain.

Acetyl cedrene (AC) was included as a model compound. Due to the hydrophobicity of AC (log K_{ow}=5.6-5.9, water solubility=1.28 mg/L), AC is likely to concentrate in sediment and pose risks to deposit-feeding organisms, such as *Capitella teleta*.

***Capitella teleta* (formerly *Capitella* sp. I)**: A deposit feeding organism that lives in sediments where it feeds on organic matter.

Both the high species density and feeding behavior of *C. teleta* could affect parent AC transport in aquatic sediment.

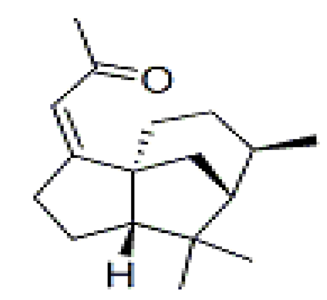
- *C. teleta* is found in highly polluted sediments at densities up to 400,000 individuals/m^2 ;
- The worms feed at the sediment subsurface and defecate on the sediment surface;
- In addition, *C. teleta* ventilate their burrows with overlying sea water.

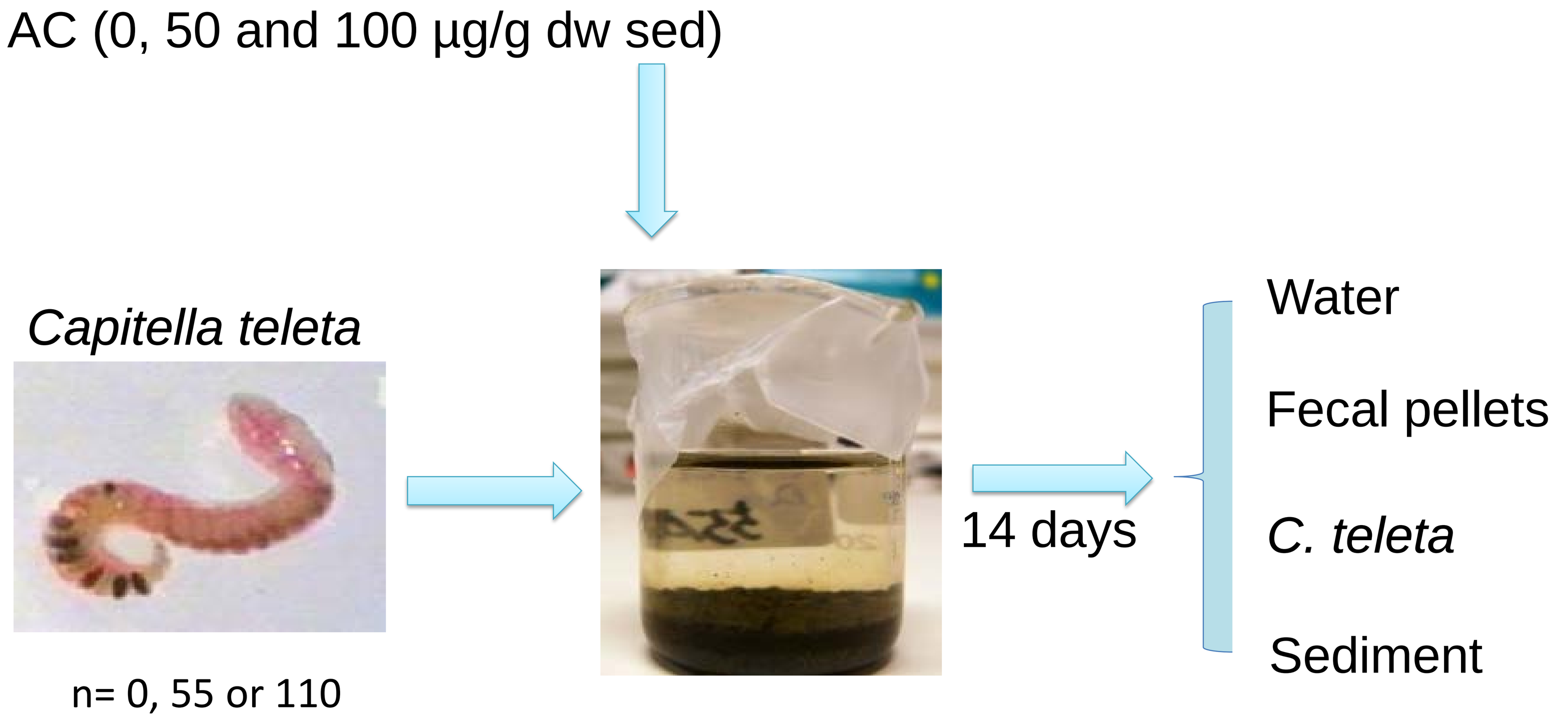
Aim

How does worm density affect the fate of sediment-associated AC?

A study of the combined effect of worm density and organic matter (OM) on fate of AC in the aquatic environment.

Experiment setup





- 3 replicates per treatment;
- AC quantifications in water, fecal pellets, *C.teleta* and sediment.

Tested species density in the present study

Tested Density	Worms added in treatments
0 individuals per m^2	0
44,000 individuals per m^2	55 ind.
88,000 individuals per m^2	110 ind.

Next step...

Examination of AC metabolites in the exposure system (worm tissue, sediment, fecal pellets) to provide information about the biotransformation capability of AC by *Capitella teleta*.

Results

Effect of AC on *C. teleta*
No lethal effect of sediment-associated AC on *C. teleta* after 14 days at 3 different exposure levels (0, 50, 100 µg/g dw sed).

AC fate in exposure system
AC was detected in fecal pellets, sediment and water.
More than 80% of AC had disappeared from the exposure systems with worms after 14 d
AC was concentrated in fecal pellets (> 11 times higher than in bulk sediment), and was not detected in *C. teleta* tissue after 14 days.
Increasing OM may facilitate AC removal.

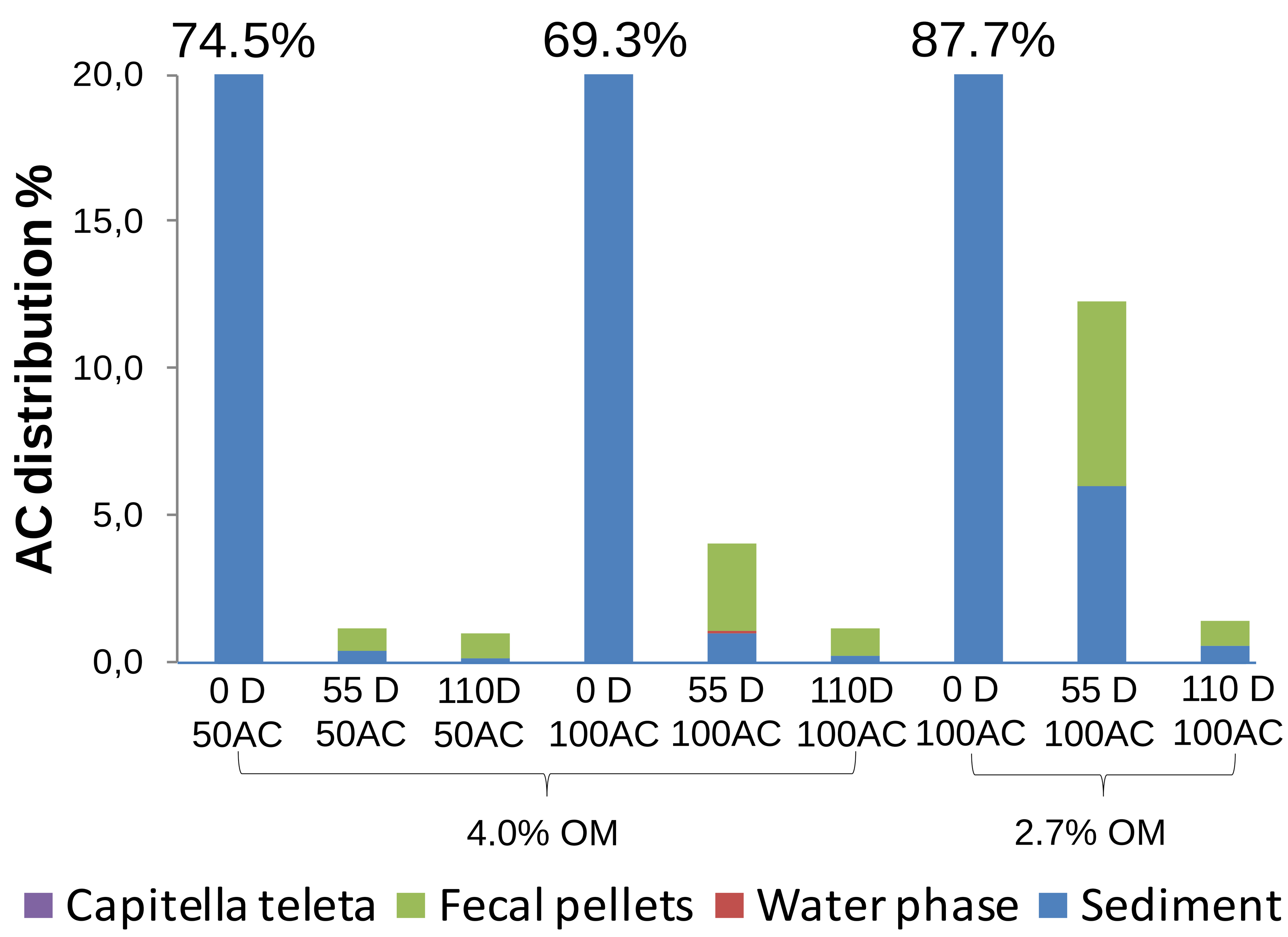


Figure: The distribution of AC in treatments after 14 days (%).The measurement was made in* C. teleta*, fecal pellets, water phase and sediment.

Conclusion

C. teleta significantly affected the fate of sediment-associated AC. After 14 days, most AC (>80%) had disappeared from exposure systems with worms. The concentrated AC in fecal pellets but not in worm tissue suggests either that AC is not bioavailable to *C. teleta* or that this species is able to biotransform sediment-associated AC (e.g., use AC as a carbon source).