

HAS THE MARINE ENVIRONMENT GOT THE 'HUMP'?

Emma L. Smith, Peter Donkin and Steven J. Rowland

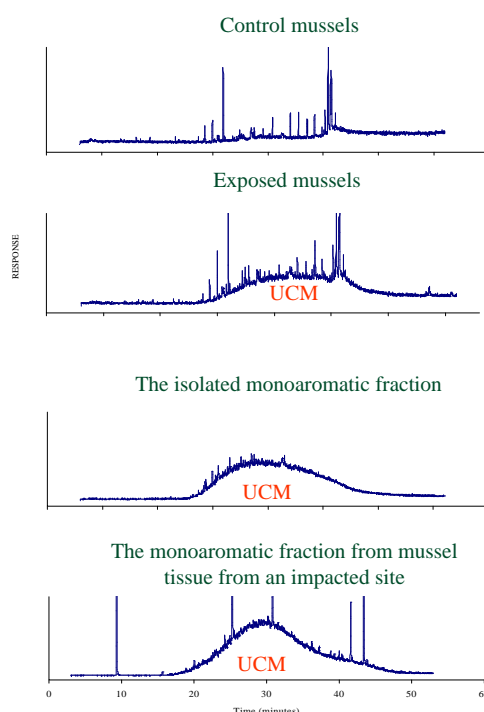
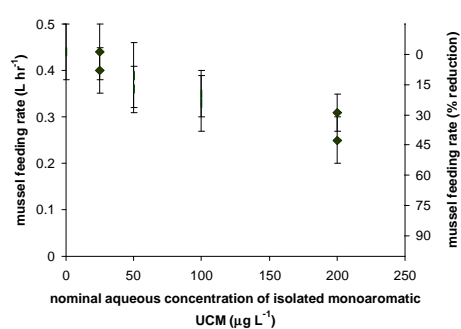
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Petroleum and Environmental Geochemistry Group, Department of Environmental Sciences, University of Plymouth, Drake Circus, Plymouth, Devon, PL4 8AA, United Kingdom

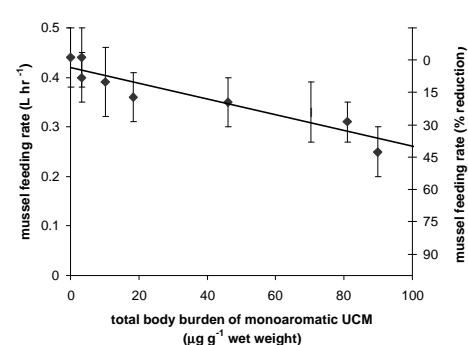
- 'Humps' are unresolved complex mixtures of hydrocarbons (UCMs)
- They are seen as humps in GC chromatograms i.e. they are unresolvable in analytical terms
 - They accumulate in the marine environment when oil is weathered
 - The impact of these compounds on the marine environment has been ignored
 - Preliminary research has shown that these compounds elicit a toxic effect
- The accumulation of these compounds in the marine environment may pose a threat to marine organisms



- Mussels are a 'sentinel' organism for the marine environment
- They accumulate pollutants from the surrounding waters
- A measure of health in mussels is 'Scope for Growth'
- Mussels with reduced 'Scope for Growth' contain UCMs
- 'Scope for Growth' has been linked to the level of aromatic hydrocarbons
- Aromatic fractions at impacted sites are dominated by aromatic UCMs
- Aromatic UCMs may be responsible for the observed reduction in 'Scope for Growth'

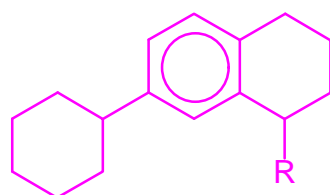


- Feeding rate is an important parameter in the 'Scope for Growth' measurement
- A monoaromatic UCM was isolated from a crude oil
 - the crude oil chosen was representative of that spilled by the *Braer*
 - the isolated monoaromatic 'hump' accounted for 10 % of the initial oil
- Mussels were exposed to the isolated monoaromatic UCM
- A reduction in feeding rate was observed
- Mussels accumulated the isolated monoaromatic UCM in their tissues
- Accumulation of monoaromatic UCMs within mussels at a level similar to those found within the marine environment causes a reduction in feeding rate



What are these compounds?

- UCMs are thought to result from the co-elution of thousands of chemically similar compounds
- A 'retro-structural' approach has shown that alkyltetralins are quantitatively important
- Three 'model' UCM compounds have been synthesised
- These were also shown to reduce mussel feeding rate



Using a Toxicity Identification Evaluation approach

- The tissue from mussels from an petroleum impacted site was extracted
- This extract was fractionated using normal phase HPLC
- The fractions were tested using the mussel feeding rate assay
- The aromatic UCM fractions reduced mussel feeding rate

The source of these pollutants to the marine environment is petroleum

These results show that contrary to popular belief when oil is weathered in the environment it is still capable of causing effects by chronic long term exposure that can be as devastating to the marine environment in the long term as an oil spill is in the short term

Monitoring programmes should be expanded to include these complex mixtures

Routes of these compounds to the marine environment should be investigated and minimised

Further study is required to understand these complex pollutants