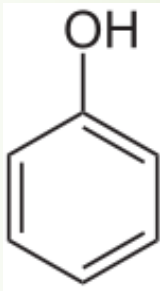
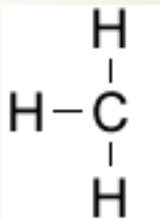

Alkylphenols are the breakdown products of alkylphenol ethoxylates (APEs). APEs were phased out of domestic detergents in 1976 but are still used in at least one surface cleaner, some paints, hand cleaners, shaving foams, shampoos, plastics, adhesives and spermicides. Most of the alkylphenols that end up in our marine environment come from industry but everyday products used by consumers also add to their accumulation.

Alkylphenols are chemical compounds that share a common structure.



"Phenol" is used to refer to any compound that contains a 6-membered aromatic ring, bonded to a hydroxyl group (OH). An "alkyl" is a free radical containing only carbon and hydrogen atoms arranged in a chain. The example below is methyl, the smallest alkyl. This is usually attached to larger chain organic molecules.



A Possible Role of Alkylphenols in Lobster Epizootic Shell Disease

Hans Laufer

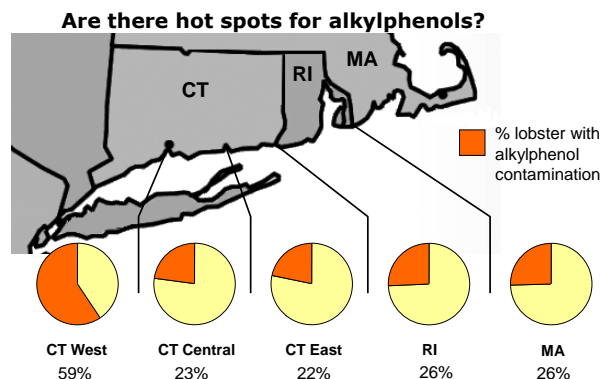
Objectives of Research:

To investigate the possible role of alkylphenols in shell disease by examining:

- contamination levels in lobsters with and without shell disease
- the effects of alkylphenols on molting, shell formation, proteins, carbohydrates, calcium and shell strength; investigate uptake, localization and incorporation of alkylphenols
- the effects of treatment with alkylphenols on shell disease formation

Results to date:

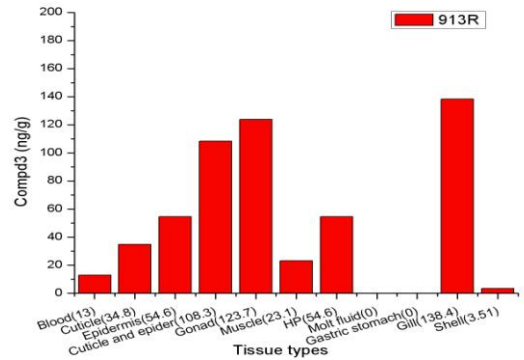
- The majority of unaffected lobsters did not have alkylphenols in their hemolymph (77%), 23% did have some evidence of alkylphenols with an average concentration between 2.9 to 182.7 ng/ml.
- Fifty-eight percent of shell diseased lobsters did not have alkylphenols in their hemolymph. However, 42% had concentrations of between 162.9-1932.7 ng/ml.
- Alkylphenols were found in sediment samples from Vineyard Sound, MA (9 - 181.2 µg/gm), Great Bay, NJ (21.6-251 µg/gm), and Woods Hole, MA (1.9-9.0 ng/g).
- Alkylphenols were found in 2 (out of 26) samples from offshore lobsters but 3 out of 5 samples of eggs were found to have concentrations of alkylphenols ranging from 3.1-545 ng/g).



Some Conclusions:

- Shell disease increases molting hormone and molting frequency
- Alkylphenols accumulate in tissues and the blood, including the cuticle. During molting, the alkylphenols appear to be taken up by the new cuticle. They are released when the cuticle is shed.
- Pilot experiments with injection of lobsters with alkylphenols have shown that the cuticle may be weakened and interfere with shell hardening.
- Alkylphenols are found at higher levels and with greater frequency in lobsters with shell disease
- Shell disease increases molting hormone.
- There may be hot spots for alkylphenols in the marine environment.

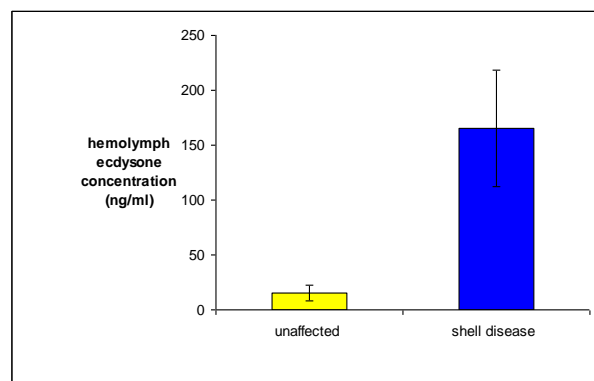
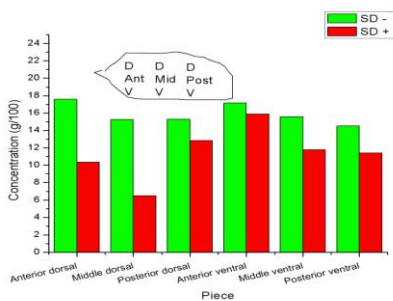
Localization of Alkylphenols After Injection



Current research question:

Is there less calcium in shell disease lobster shells? Is there a relationship between alkylphenols and calcium concentration?

Calcium Content from Normal and SD Lobster Shells



Hans is a Professor Emeritus, at the University of Connecticut in the Department of Molecular and Cell Biology.

