Journal of Emerging Investigators
Where students become scientists

Environmental Sciences: Bioremediation

Paper citation: Cao X, Xiong Y, and Lund J (2013). The effects of micro-algae characteristics on the bioremediation rate of Deepwater Horizon crude oil. J Emerging Investigators *8*: 1-7

Paper questions

In reading through the assigned papers, please answer the following questions:

1. What is the question being investigated by the researchers?

The researchers want to learn if algae can be used to influence degradation rates of crude oil.

2. What was the Deepwater Horizon spill?

The Deepwater Horizon oil spill was the largest marine petroleum oil spill in history, beginning with a blowout of the Deepwater Horizon oil well in the Gulf Mexico. It began on April 20, 2010, and finally sealed on September 19, 2010.

3. What are currently the most prominent methods of oil spill cleanup?

Oil spill cleanup efforts typically use mechanical pumping, combustion, and bacterial bioremediation.

4. What were the hypotheses of the investigators?

The investigators hypothesized that various algaes may be capable of degrading crude oil, and that its efficacy would depend on motility, levels of chlorophyll, or multi-cellular formation.

5. Describe the authors' experimental approach.

The authors cultured algae in Deepwater Horizon crude oil samples for 15 days, measuring crude oil mass and algae growth, and making qualitative observations regarding the degradation.

6. How did the authors assess crude oil degradation?

Through measurement of crude oil mass.

7. What were the results of the authors' experiments? Were their hypotheses supported?

The authors found that most algae were capable of bioremediation, but that their efficacy did not depend on motility, levels of chlorophyll, or multicellular formation. Therefore, the second hypothesis was not support.

8. Which algae species exhibited the highest rate of crude oil degradation?

   C. elabens **exhibited the highest rate of crude oil degradation.**

9. What are some shortcomings of this paper?

   One shortcoming the authors mention is that they did not control for variable degradation of different types of crude oil, e.g. heavy vs. light crude.

10. Propose two follow-up experiments that could be performed given the data presented in this paper.

    The authors could test degradation of heavy vs. light crude, or attempt to manipulate variables such as temperature and pH to see what conditions maximize oil degradation using one of the algae types.