



- grey biotechnology-

Oil biodegradation and bioremediation

Mariasole P., Júlia M..

Bioremediation

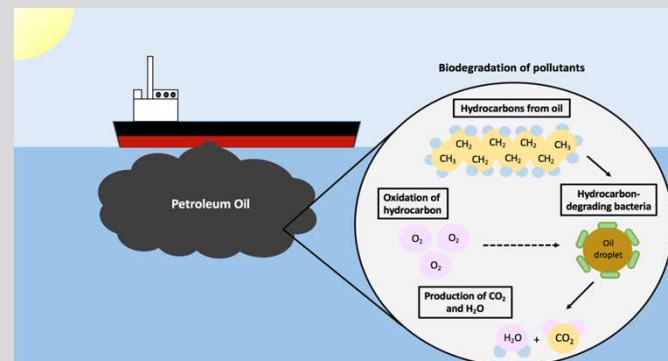
Algae laid down 100-200 million years ago constantly input small amounts of hydrocarbons as waste products: crude oils are natural part of marine environment. Because of this, a huge number of aquatic microorganisms have evolved the capability of turning hydrocarbons into carbon dioxide and energy; in other words they are able to use what we commonly call “pollutant compounds” as source for their growth.

The use of microorganisms in order to degrade contaminants, such as oil, is called “bioremediation”.

Who?

Alkanivorax Borkumensis is a marine bacterium which naturally propagates in seawater containing crude oil. Its genome encodes for many efficient oil-degrading enzymes. It flourishes only near the surface of water.

Oleispira Antarctica is a cold marine bacterium, which means that it is able to perform remediation of oil even in cold and deep water, where *Alkanivorax* can't live.



https://commons.wikimedia.org/wiki/File:Biodegradation_of_Pollutants.png

How?

- Oil leakage = increase of bacteria's nutrient = increase of population.
- Use of emulsifiers to break up oil into droplets.
- Creation of a biofilm around the droplets.
- Enzymes (Alk1 and Alk2) are used to oxidize alkanes and obtain carbon dioxide and water.
- Bacteria use CO₂ as source for their growth.



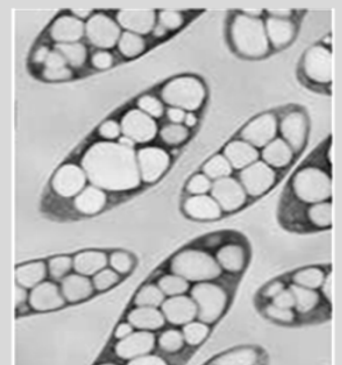
https://en.wikipedia.org/wiki/Biofilm#/media/File:Screen_Shot_2017-12-13_at_1.40.19_PM.png



<https://www.worldwildlife.org/stories/five-years-after-deepwater-horizon-spill>

Minerv Biorecovery

It's a new project based on the use of bioplastic powders suitable to host bacteria. It offers a home to microorganisms, makes them grow and strengthen them to attack the oil. This bioplastic is obtained from renewable plants sources.



<https://commons.wikimedia.org/wiki/File:PHAs.png>