Changing microbial dynamics in the wake of the Macondo blowout

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In an article in the September issue of *BioScience*, Samantha Joye and colleagues describe Gulf of Mexico microbial communities in the aftermath of the 2010 Macondo blowout. The authors describe revealing population-level responses of hydrocarbon-degrading microbes to the unprecedented deepwater oil plume.

The spill provided a unique opportunity to study the responses of indigenous microbial communities to a substantial injection of hydrocarbons. Surveys of genetic identifiers within cells known as ribosomal RNA and analyses relying on modern techniques including metagenomics, metatranscriptomics, and other methods revealed quickly changing population sizes and community structures. The presence of oil-degrading microbes, which was determined through the use of ribosomal RNA signatures, was found even after the dissipation of the initial plume, which provides evidence that seed populations persist and may be maintained by natural oil seepage or small accidental leaks.

Perhaps one of the most striking features of the microbial response to the blowout was the rapid formation of large flocs of marine "snow." The flocs were initially observed in the upper water column and constituted the precursors to a massive pulse of oil-derived sediment that settled near the wellhead in the weeks following the accident. The rapid movement of oil to the seafloor in the form of microbe-induced marine snow represents a previously unrecognized outcome for marine hydrocarbons that may have far-reaching implications. The authors performed laboratory simulations of marine oil snow formation and

identified several possible microbial mechanisms for the formation of the snow, including the creation of mucus webs through the action of bacterial oil degraders. As a result of their findings, Joye and her colleagues call for the inclusion of marine snow in the federal oil budget, which is intended to describe the fate of discharged oil.

The authors close with a call for additional research. Further study is needed both to increase the understanding of oil-degrading microbes and to quantify the rates at which they may degrade spilled oil.

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