Title
Diversity of sulfate-reducing bacteria isolated from the Katrina Floodwaters in New Orleans

Author
Hazen, T.C.

Publication Date
2007-06-26

Diversity of Sulfate-Reducing Bacteria Isolated from the Katrina Floodwaters in New Orleans

Chakraborty, R., E. L. Brodie, R. Phan, D. Joyner, Y. Piceno, G. L. Andersen, M. S. Humphrys, T. H. Hazen, P. Sobecky, T. C. Hazen

Abstract

Following the hurricane Katrina and subsequent flooding in New Orleans, samples of the floodwater were collected from several isolated sites in and around the city. We investigated the diversity of culturable sulfate reducing bacteria in these unique environmental samples. For isolation, enrichments were set up at 30oC in the dark using lactate (60mM) as the sole electron donor and sulfate (50mM) as the electron acceptor in anaerobic minimal media. Positive enrichments were identified from all site sources within 4 days of incubation and transferred periodically (6 times) before isolation on solid LS4D agar plates. Isolated colonies developed within 4 days and several isolates were obtained from each of the sampling sites. Preliminary analysis of the 16S rRNA genes of these isolates revealed that they belonged primarily to the Desulfovibrio genus and Desulfomicrobium genus of the Proteobacteria. Interestingly, isolates obtained from the water sample taken close to the US Coast Guard Station and the levee fracture site showed dominance of Desulfovibrio species, whereas those obtained from the Aerator site and the University of New Orleans campus showed predominantly Desulfomicrobium species. Representative isolates from each site were chosen for further characterization. Desulfomicrobium strain Nor2a from the Aerator site was highly motile, gram negative, non-sporulating bacterium. However while most Desulfomicrobium species are rod shaped, strain Nor2a is a vibrio, growing optimally at 370C. Apart from lactate, it also utilized alternative electron donors like pyruvate and fumarate. Desulfovibrio strain Nor1a isolated from the Coast Guard station was a coccobacilli, highly motile, gram-negative organism that could also reduce nitrate as an electron acceptor. More detailed characterization of the physiological and biochemical properties of these isolates is ongoing. Comparisons of isolates obtained from the same site as well as those belonging to the same genus obtained from a different site will enhance our understanding of the diversity and biogeography of these sulfate-reducing bacteria.

Funding Source

Environmental Stress Pathway Project (ESPP)

Keywords

Bioremediation, Environmental Genomics, Field Studies, Sulfate Reducers