On the Evolution of Selenium Respiring Bacteria

Respiratory flexibility allows microorganisms to thrive in geologic environments. The ability of anaerobic prokaryotes to employ different terminal electron acceptors for respiration permits these organisms to colonize and populate ecological niches in Earth's subsurface. One such adaptation is the ability of anaerobes to respire selenium oxyanions in anoxic sediments. To date, numerous phylogenetically diverse species of anaerobic bacteria have been shown to grow by coupling the oxidation of organic carbon with the reduction of selenium oxyanions. In the past decade, significant advances has been made on our understanding of the molecular basis of selenate respiration. This presentation will describe the genes that are required for microbial selenate reduction in facultative anaerobic bacteria. Recent results will be discussed in the broader context of selenium biogeochemistry and the evolution of alternate anaerobic respiration pathways.