Breathing Chlorinated Solvents: Reductive Dechlorination by and

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Highly chlorinated organic compounds, like the solvents tetrachloroethene (PCE) and trichloroethene (TCE), are resistant to aerobic biodegradation, but anaerobes can reductively remove chlorines from them, using them as electron acceptors for anaerobic respiration. Our laboratory was the first to culture and isolate (now) the first organism known to completely dechlorinate chlorinated ethenes completely to non-toxic ethene. They are highly specialized for this process, with small genomes (~1.5 Mb) containing numerous reductive dehalogenase (RDase) genes, and play an important role in chloroethene bioremediation. In more recent studies on chlorinated benzenes, we found Dehalobacter strain MCB1, that can completely dechlorinated monochlorobenzene (MCB) to benzene. Benzene is more toxic than chlorobenzenes. Dehalobacter can couple with the organisms in a benzene-utilizing anaerobic consortium to convert MCB to nontoxic CH_4 and CO_2.