Chloroform cometabolism by butane-grown CF8, Pseudomonas butanovora, and Mycobacterium vaccae JOB5 and methane-grown Methylosinus trichosporium OB3b

Hamamura N, Page C, Long T, **Semprini L**, Arp DJ

APPLIED AND ENVIRONMENTAL MICROBIOLOGY
63 (9): 3607-3613 SEP 1997

Abstract:
Chloroform (CF) degradation by a butane-grown enrichment culture, CF8, was compared to that by butane-grown Pseudomonas butanovora and Mycobacterium vaccae JOB5 and to that by a known CF degrader, Methylosinus trichosporium OB3b. All three butane-grown bacteria were able to degrade CF at rates comparable to that of M. trichosporium. CF degradation by all four bacteria required O-2. Butane inhibited CF degradation by the butane-grown bacteria, suggesting that butane monooxygenase is responsible for CF degradation. P. butanovora required exogenous reductant to degrade CF, while CF8 and M. vaccae utilized endogenous reductants. Prolonged incubation with CF resulted in decreased CF degradation. CF8 and P. butanovora were more sensitive to CF than either M. trichosporium or M. vaccae. CF degradation by all three butane-grown bacteria was inactivated by acetylene, which is a mechanism-based inhibitor for several monooxygenases. Butane protected all three butane-grown bacteria from inactivation by acetylene, which indicates that the same monooxygenase is responsible for both CF and butane oxidation. CF8 and P. butanovora were able to degrade other chlorinated hydrocarbons, including trichloroethylene, 1,2-cis-dichloroethylene, and vinyl chloride. In addition, CF8 degraded 1,1,2-trichloroethane. The results indicate the potential of butane-grown bacteria for chlorinated hydrocarbon transformation.