

FEDERAL RESEARCH IN PROGRESS (DEC 1989)

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Metabolic Pathway Engineering of the 1,3 - Propanediol System

PRINCIPAL INVESTIGATOR: Cameron, D.C. Dr.

PERFORMING ORG.: University of Wisconsin Madison, Chemical Engineering,
Madison, WI 53706

SPONSORING ORG.: National Science Foundation, DIV OF BIOLOGICAL AND
CRITICAL SYSTEMS, 1800 G Street, N.W., Washington, D.C. 20550

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SUMMARY: Metabolic Pathway Engineering (MPE), defined as the design, analysis, and construction of biochemical pathways, is an emerging technology with broad implications for the production of chemicals and the degradation of toxic compounds. MPE involves adding genetic material to a host organism to modify an existing pathway or to create a new one. The objective of this project is to directly address key problems associated with MPE by constructing a new pathway in *E. coli*. The model pathway selected for this research is the conversion of glycerol to 1,3 - propanediol as carried out by *Klebsiella pneumoniae*. The first step is to characterize the carbon flux and intracellular intermediate concentrations of *K. pneumoniae*, as a basis of comparison with the engineered *E. coli*. The final step is to then study the function of the new pathway in *E. coli* and investigate its interactions with the host metabolism. This work is expected to provide new insight into MPE and to provide a well characterized model system for further research. In addition, 1,3 - propanediol is a useful chemical intermediate, and it is possible that this work will lead to improvements in its production.