Influence of GOX1969 on the growth and bioproductivity of *Gluconobacter oxydans*

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Gluconobacter oxydans is a gram-negative acetic acid bacterium exhibiting unique metabolic characteristics that enable the incomplete oxidation of various carbohydrates and alcohols. This process is mediated by membrane-bound dehydrogenases with many of them being classified as a pyrroloquinoline quinone (PQQ)-dependent dehydrogenase. GOX1969 was mischaracterized as a PQQ-dependent dehydrogenase and was recently shown to be a functional BamB homolog that acts as part of the β-barrel assembly machinery (BAM) complex that inserts porins into the outer membrane. Overexpression of GOX1969 in *E. coli* improved the growth rate. We hypothesize that GOX1969 overexpression will similarly improve the growth of *G. oxydans*. This study aims to elucidate the influence of GOX1969 on the growth of *G. oxydans* by cloning the *gox1969* gene into three distinct overexpression vectors, each with varying promoter strengths. The growth phenotypes of the *G. oxydans* overexpression strains will be assessed to determine the correlation between promoter strength and bacterial growth rate. The product production of gluconate from glucose will also be assessed to determine the amount of glucose being consumed when GOX1969 is being expressed. The findings from this study will have potential industrial applications and will also contribute to the development of overexpression vectors for acetic acid bacteria, paving the way for further metabolic engineering and optimization of *G. oxydans* for industrial purposes. The results will provide insights that will help advance our understanding of *G. oxydans* physiology and optimize its potential utility as an industrial bioproduction strain.