Proc. KMB Autumn Meeting
October 26, 2002, Seoul, Korea

CO_2 Fixation Using Chemoautotrophic Microorganisms

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Microorganisms that can biologically fix CO_2 gas were isolated and their characteristics were investigated. The isolated strains included strain YN-1 as a hydrogen-oxidizing marine bacterium as well as Aeromonas sp. strain JS-1 as a fresh water bacterium. Strain YN-1 and strain JS-1 can fix CO_2 via the reductive TCA cycle and Calvin-Benson cycle, respectively. It is guessed that the strain YN-1 is a new CO_2-fixing hydrogen-oxidizing marine bacterium by 16S rDNA sequence analysis. A RuBisCO, the key enzyme of the Calvin-Benson cycle, was purified from Aeromonas sp. strain JS-1. After the gel filtration chromatography and non-denatured PAGE were carried out, molecular weight of purified RuBisCO was about 560 kDa. The RuBisCO was confirmed to consist of L_8S_8 subunits by SDS-PAGE, a large subunit was about 56 kDa, and a small one was about 14 kDa. Generally, the source of hydrogen needs to grow hydrogen-oxidizing bacteria. Hence, the isolation of bacterium producing hydrogen is required. In this study, a bacterium producing hydrogen was isolated and identified as Enterbacter cloacae strain VJ-1. Strain VJ-1 could produce hydrogen of 1,920 ml/l for 48hr under optimal culture condition.