【Title of Paper】

Finding of Microcystin-degrading Bacterium and Elucidation of Its Degradation Mechanism

【Author's Name】

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【Abstract】

We isolated microcystin (MC)-degrading bacterium, named C-1 from water bloom under alkali condition for the first time. The bacterium was investigated characterization for reveal of sharp MC degradation at the collapse of water bloom. Consequently, the bacterium showed alkali tolerance, which can grow under pH 11.0. Microcystin RR was degraded easier than microcystin LR by strain C-1. And MC degradation activity sustained over half activity even in pH 9.00 compared with around neutral (optimum) pH condition. Moreover, MC degradation mechanism by the bacterium was analyzed. It is well known that *mlrA*, *mlrB* and *mlrC* encode MC-degrading enzymes in MC-degrading bacteria. We proved the mechanism by which transcription of these genes was induced in strain C-1. We showed induction of the transcription of *mlrA*, *mlrB* and *mlrC* by microcystin-LR (MCLR) and that of *mlrA* and *mlrB* by MCLR degradation products (linear microcystin, H-Adda-Glu-Mdha-Ala-OH (tetra peptide) and 2S, 3S, 8S, 9S-3-amino-9-methoxy-2, 6, 8-trimetyl-10-phenyldeca-4E, 6E-dienoic acid (Adda)). Adda was found to play a key role in the induction of transcription of *mlrA* and *mlrB*, while the cyclic structure of MCLR was important for the induction of transcription of *mlrC*. It was found that the MC-degrading bacteria responded to MCLR and its degradation products by degrading enzymes (MlrA, MlrB and MlrC) through a sequential chain reaction for expression of MlrA, MlrB and MlrC.