PGb-10
Distribution of chlorophyll f in hot spring microbial mats
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Key word: cyanobacteria, chlorophyll f, microbial mat, photosynthesis

Chlorophyll (Chl) f is a recently discovered photosynthetic pigment, which absorbs far-red (FR) light (700-750 nm). The distribution and role of Chl f in natural environments were still unclear. We have isolated Chl f-containing cyanobacteria from various habitats by cultivation using FR-LED as their sole light sources. These cyanobacteria produced Chl f only when the cells were grown under FR-LED. Therefore, we hypothesized that Chl f was produced only in certain environments where FR light mainly existed, and contributing to oxygenic photosynthesis there. Inner layer of microbial mat was considered to be one of such environments, because photosynthetically active radiation (PAR, 400-700 nm) was absorbed by phototrophs in surface layer. In this study, we aimed to reveal the vertical distribution of Chl f and the light environment within hot spring microbial mats. We collected 20 microbial mat samples at 6 different sites in Nagano and Gifu prefectures in Japan. Chl f was detected from 6 samples of them. Vertical profiles of Chl f and downward spectral irradiance were measured by using HPLC and fiber optic spectrometer, respectively. Community structure analyses in mats were performed by PCR-DGGE for determining Chl f-producing cyanobacteria. In this poster, we discuss the adaptive significance of Chl f in microbial mats.

PGb-12
Illumination changed the response to oxygen of a facultative anaerobic photosynthetic bacterium, Chloroflexus aggregans
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Key word: vertical distribution, gliding motility, oxygen gradient, microbial mat

Chloroflexus aggregans is widely distributed within microbial mats in hot springs, but the populations at aerobic-light surface and the anaerobic-dark bottom of mats are limited. We have shown that C. aggregans cells gathered around the border between anaerobic and aerobic area in cultivation tubes during incubation in the dark. In this study, we evaluated effects of illumination on the moving behavior of this phototroph. C. aggregans cells were suspended into a liquefying agar medium (a soft agar medium at 65°C) which was free in organic compounds. The agar medium was solidified in glass test tubes and incubated in the light. After 24 hours of incubation at 55°C, the cells still distributed equally across the aerobic surface of medium. Comparing with the incubation in the dark, the cells moved toward aerobic area and also stayed at anaerobic area. Cell motility is energy driven behavior of bacteria. Photosynthesis induced higher energy production than aerobic respiration with limited amounts of organic compounds. High motility under photosynthetic conditions may decelerate the difference of cell motility in the incubation tube and diminish gathering of cells at particular area. In addition, a part of the energy produced by photosynthesis could be utilized to reduce oxidative stress resulting in a wide distribution into aerobic area.