

クリオコナイトの氷河環境における生理学的特性

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Physiological characterization of cryoconites on glacial surface

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Cryoconite particle which is a bacterial community constructed on a surface of glacier have a critical role for ecosystems in glacial environments. Cryoconite particles realize to keep internal material cycle in spite of severe conditions. We had done some incubation experiments in their habitat, cryoconite holes, at Austre Brøggerbreen in Ny-Ålesund for clarifying their physiological characteristic features, e.g. photosynthesis, respiration and nitrogen fixation. Photosynthetic activity was measured by using stable isotope, H₂¹⁸O, and measuring concentrations both of CO₂ and ¹⁸O¹⁶O with gas chromatography and mass spectroscopy (GCMS). The CO₂ fixation under the habitat was especially suppressed because of low temperature, near to zero, however rate of O₂ generation caused by water splitting in photosystem II was much higher than CO₂ fixation. This result suggests that some alternative electron transport reactions for protecting photosystems from excess reduction power. Temperature dependency of photosynthetic activity was measured by using a PAM chlorophyll fluorometer. The most suitable temperature for photosynthesis was around 30 °C. Some photosynthetic activity was kept even in 0 °C, although it was suppressed under 10 °C. These results revealed that photosynthetic organisms in cryoconite particles are suppressed activity of CO₂ fixation by low temperature conditions, however they are having prominent activity of alternative electron transport, for avoiding photoinhibition.