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海洋性酸素非発生型好気性光合成細菌の光従属栄養性
Photoheterotrophy of marine aerobic anoxygenic phototrophic bacteria

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Aerobic anoxygenic phototrophic bacteria (AAnPB) containing the photosynthetic pigment bacteriochlorophyll (BChl) *a* can grow phototrophically and/or heterotrophically. Therefore, their metabolic performance is called photoheterotrophy. Recently, AAnPB and other photoheterotrophs including proteorhodopsin-containing bacteria and cyanobacterium *Prochlorococcus* have been classified into a new functional group in terms of energy acquisition. Although it has become clear the ubiquitous distributions of AAnPB in the upper oceans with their high spatiotemporal variations, what controls their population dynamics is still an open question. Based on the intriguing AAnPB ecophysiological characteristics, there is a hypothesis that their photoheterotrophy could be beneficial in nutrient-poor environments such as oligotrophic oceanic waters. However, this hypothesis has not yet been experimentally verified well. Therefore, we investigated the photosynthetic responses of a coastal *Roseobacter* strain OBYS 0001 of marine AAnPB to an organic substrate limitation. In the batch cultures at 20^{o}C, the growth curve and cellular BChl *a* concentration of the substrate-limited strain grown in 1/100 ZoBell 2216E medium kept constant, while those in the undiluted medium increased with time. Variable BChl *a* fluorescence measurements revealed that changes over time in the functional absorption cross-section (sigma) of the photosystem for the strain were little distinct between the two conditions. However, the maximum photochemical quantum efficiencies (F_v/F_m) of the photosystem under the substrate-limited condition were significantly higher than those in the substrate-rich circumstance. These results suggested that AAnPB can enhance their photosynthetic activity with increasing the photochemical conversion efficiency without changing their antenna size under organic substrate limitations. In this presentation, we would like to emphasize the significance of photoheterotrophy for AAnPB in the oceans using our latest results and the past literatures.

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