

Vertical distribution and abundance of *Acaryochloris* spp. at the deepest area of Lake Biwa

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The genus *Acaryochloris* is the only organism which contains Chlorophyll *d* (Chl *d*) as their predominant light harvesting pigments. This cyanobacteria can absorb and use far-red light (FR), ranging from 700 to 750 nm, as well as visible light (400-700 nm) for oxygenic photosynthesis. Therefore, the ecological and the critical role of Chl *d* have been thought to utilize FR effectively, avoiding the competition for visible light with other chlorophyll *a* (Chl *a*) containing algae and providing niche to the genus *Acaryochloris*.

In our successive works, we have detected 16S rRNA gene of *Acaryochloris* spp. from the water samples collected at more than 30 m depth in Lake Biwa. At the depths, no FR was thought to be remaining. This suggested that the detected planktonic *Acaryochloris* spp. could not utilize FR for photosynthesis.

The purposes of this study were to reveal the niche of planktonic *Acaryochloris* spp. and the adaptive significances of Chl *d* in that depth. For these purposes, we established a real-time PCR method to quantify the copy of *Acaryochloris*-16S rRNA gene and investigated the vertical distribution of planktonic *Acaryochloris* spp. at the deepest area of Lake Biwa. Additionally, we compared the solar radiation spectra at the depth where *Acaryochloris* spp. were detected and the excitation spectrum of *Acaryochloris* cells. We would like to present the results of our investigations and discuss about the adaptive significances of Chl *d* for the planktonic *Acaryochloris* spp. in Lake Biwa.

Keywords: *Acaryochloris* spp., chlorophyll *d*, vertical distribution, real time PCR, Lake Biwa