

Symbiotic relationship between *Braarudosphaera bigelowii* and cyanobacteria

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Braarudosphaera bigelowii (Haptophyta, Prymnesiophyceae) is a single-celled coastal coccolithophores, which is characterized by regular dodecahedral exotheca consists of regular pentagonal calcareous scales called pentoliths. Fossil records of the Family Braarudosphaeraceae and *B. bigelowii* extend back to the early and late Cretaceous, respectively. Living and fossil *B. bigelowii* have significant variation in size of pentoliths. Molecular phylogenetic study of living *B. bigelowii* revealed that morphotypes of living *B. bigelowii*, which was classified based on the size of pentoliths, can be related to the 18S rDNA genotypes. Therefore, it is thought that living *B. bigelowii* is a species complex consists of at least four discrete species which can be differentiated from each other based on size of pentoliths and of 18S rDNA sequences (Hagino et al. 2009). A recent study revealed close phylogenetic relationships among *B. bigelowii* sensu stricto (morphotype Intermediate form B, 18S rDNA Genotype III), *Chrysochломulina parkeae* (Prymnesiophyceae) and a prymnesiophyte cell that has symbiotic association with a nitrogen-fixing cyanobacterium UNYN-A. The prymnesiophyte host cell receives nitrogen from the cyanobacterium in exchange for transferring fixed carbon (Thompson et al., 2012). It was an unexpected relationship since *B. bigelowii* dissimilar to *C. parkeae* in general morphology, and *B. bigelowii* differs from UCYN-A in geographic distribution; living *B. bigelowii* is a notable coastal-neritic dweller, while the UCYN-A were abundantly reported from oligotrophic open ocean. In order to examine their relationships, we have conducted transmission electron microscopic and molecular phylogenetic studies of *B. bigelowii* and *C. parkeae*. In this talk, we will present an overview of geological history of the Family Braarudosphaeraceae, and morphological and genetic diversity in living *B. bigelowii*. We will also discuss about relationships among *B. bigelowii*, *C. parkeae* and the prymnesiophyte host of the UCYN-A based on the results from our morphological and molecular phylogenetic studies.

References:

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