**Japan Geoscience Union Meeting 2010**
(May 23-28 2010 at Makuhari, Chiba, Japan)


BPO021-12 Room: 301B Time: May 25 12:00-12:15

# Evolution and diversity of Collodaria (Radiolaria)

Yoshiyuki Ishitani[1*], Kozo Takahashi[2]

[1]JAMSTEC, [2]Depatment of Sciences, Kyushu University

Collodaria, which is one order of the Radiolaria, has specific characters represented by high diversity in the oligotrophic region. They are categorized into persistant obligatory acquired phototrophy marine protists which cannot grow and reduce survival time without symbionts (Stoecker et al., 2009). Colonial life style groups (Collosphaeridae and Sphaerozoidae) possess a lot of symbionts ($2x10^6$cells in a large colony, Anderson, 1980), and have high primary productivity (e.g., 1400-41000 ng Carbohydrate/colony/hour; Swanberg and Harbison, 1980.) inside of colony. Their fixed carbon is estimnated three times as much as phytoplankton (Gulf of Aden; Khmeleva, 1967; Taylor, 1990). Their hibitat are characterized in oligotrophic surface waters. This may be caused by their high capability in nutrition (Carbohydrate in Collosphaera huxleyi; 91.16 ug, Anderson et al., 1983). Even some solitary groups (Thalassicollidae) also have a high potential to keep nutrient inside of a cell (Carbohydrate in Thalassicolla nucleata; 0.16 ug, Anderson et al., 1983). They are showing good adaptation to the oligotrophic conditions. Moreover, solitary Collodaria like Thalassicollidae and colonial Collodaria segregate their niches into the subarctic and subtropical to tropical region, respectively. How and when Collodarian adaptation started are good questions for paleontology to understand the development of the oligotrophic conditions. However, we do not have enough fossil record of Collodaria because of many naked Collodaria. This fact leads less understanding of collodarian evolution and their adaptation to the subarctic, subtropical, and tropical oligotrophic regions.

Phylogenetic analysis of nuclear Small-SubUnit ribosomal DNA (SSU rDNA) reestablishes taxonomy and evolutionary patterns of Collodaria. Our phylogeny of seventeen sequence data, including four novel Collodarian sequences and eleven published sequences and two environmental sequences, describes four families (Thalassicollidae, Collosphaeridae, Collophidae, Sphaerozoidae) and shows that the Thalassicollidae family is sister group to the other Collodarian families. This divergence is characterized by differences of life style (solitary; Thalassicollidae, colony; other Collodaria) and niche (the subarctic region; Thalassicollidae, the tropical-subtropical region; other Collodaria). We establish new taxonomic scheme based on molecular phylogeny and cell morphological character, and clarify a possibility that Collodarian ancestor could be Thalassicollidae. Their divergence time was estimated around 45 Ma, after Early Eocene Climate Optimum. This inference could be useful information to understand Collodarian evolution.

Keywords: Radiolaria, Collodaria, evolution, paleoceanographic change