

Estimation of the Time for Branching into Chlorella and Land Plants and Molecular Evolution of Chlorella TPI Gene

Presented at the 27th Conference of the Molecular Biology Society of Japan

[Objectives]

During the course of evolution, organisms have undergone changes to endure environmental conditions they were exposed to. Among these organisms, Chlorella has overcome very severe environments while retaining its ancient form. This was possible because of the strong vital power of Chlorella, and the pharmacological effects of Chlorella are considered to originate from such a nature of this plant since the ancient time. Within the framework of unveiling the mystery related to Chlorella, we explored the course of Chlorella evolution.

[Phylogenetic analysis]

It is said that eukaryotes, which are the ancestors for Chlorella, appeared two billion and odd years. Subsequently, overcoming severe changes in environments and being stimulated by such changes, numerous organisms such as plants, animals and fungi underwent evolution. Charophyceae (stoneworts) are considered as closets to plant plants, and Chlorophyta (green algae) such as Chlorella are considered to have branched much earlier. In understanding the evolution of plants, it is very important to know the time when the plants leading to the current plants appeared from the green algae serving as the ancestor, i.e., the time when green algae branched into stoneworts and land plants. To date, however, no comprehensive analysis using numerous genes has been conducted.

[Analytical methods]

Of the Chlorella DNA, 10 genes were analyzed and compared with the genes of 13 groups of organisms to estimate the time of branching.

[Results]

The following findings were yielded as to the time of branching.

- (1) Chlorella and Chlamydomonas: about 540 million years ago
- (2) Green algae (Chlorella) and plants: about 610 million years ago
- (3) Plants and animals/fungi: about 1.26 billion years ago

The time of branching into Chlorella and Chlamydomonas corresponds to the time of Cambrian explosion (explosive increase of the species of organisms).

<<Presentation at a professional society meeting>>

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