Basic studies on the system for decreasing atmospheric CO_2 by means of calcareous and halophiric algae and analysis of the properties of halotolerant carbonic anhydrase

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summary

Basic characteristics on the kinetic analysis of $^{14}CO_2$ fixation by a marine unicellular coccolithophorid, *Emiliania huxleyi* was performed using a silicone-oil- layer-centrifugation technique.

1. When air containing 0.03% CO_2 was bubbled into the suspension of *Emiliania huxleyi* with a rate of 100 ml/min, the concentration of CO_2 dissolvede in the medium (DIC) was kept constant at the level much lower than that in the medium without the algae.

2. ^{14}C-DIC was incorporated into an internal pool once, and then used for the photosynthetic fixation and the calcification. However, the concentrating activity, namely ratio of the concentration of internal DIC to external DIC, was much lower than that of unicellular green algae and cyanobacteria.

3. $CaCO_3$ in coccoliths was re-utilized for photosynthetic CO_2 fixation by *Emiliania huxleyi* when the concentration of external DIC was decreased by the algal utilization.

4. When ^{14}C-DIC was added into the algal suspension in an open-system, ^{14}C release into air-space during algal growth in *Emiliania* was about a half of that in *Dunaliella* which has halotolerant carbonic anhydrase. The release of ^{14}C was much more in the dark in both algae.

These results suggest that calcaleous algae like coccolithophorids play an important role for keeping DIC in the ocean and also absorbing atmospheric CO_2 and the ability is bigger than non-calcifying algae like *Dunaliella* especially under light/dark regimes.