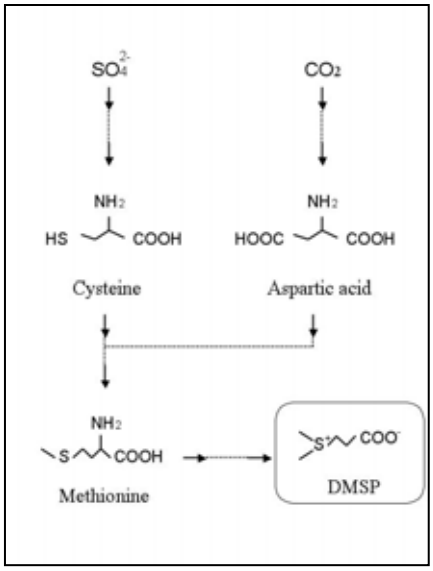
Biosynthesis of compatible solutes involved in salt acclimation of algae

Misako Kato

Graduate School of Humanities and Sciences, Ochanomizu University

Almost all cells are able to live within a certain range of enhanced salt concentrations due to the accumulation of compatible solutes. Compatible solutes, which are low-molecular weight, highly hydrophilic organic compounds, can be accumulated in high concentrations without interfering with the cellular metabolism. In the present study, the author investigated the induction of the biosynthesis in compatible solutes during salt acclimation using *Enteromorpha compressa* (Chlorophyceae)which adapted to the external salt concentrations with the dynamic change. Organic solutes were examined by ^{1}H-NMR spectra and major organic solute was identified as DMSP (Dimethylsulfoniopropionate). A close correlation was found between the intracellular level of DMSP and salinity, suggesting that DMSP had osmoregulatory function in *E. compressa*.

The outline of the biosynthetic pathway in DMSP was as follows; SO_4^{2-}→methionine→ DMSP. Feeding experiments with $^{35}SO_4^{2-}$ demonstrated that DMSP biosynthetic activity was induced by the high salt concentration. The activity increased sharply and reached maximal activity after 9 hours-acclimation. On the other hand, the biosynthetic activity from [methyl-^{14}C]methionine to DMSP remained constant in spite of acclimation period. The obtained results suggested the activation of the former part in the pathway (SO_4^{2-}→methionine) was involved in the increase of DMSP during high-salt acclimation. The biosynthesis of DMSP might be regulated by the supply of methionine *in vivo*.



Pathways for biosynthesis of DMSP