Salt-tolerant mechanism of a protozoan, *Euglena gracilis Z*

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Summary

Elevation of the CO_2 level in the atmosphere is a major problem for the earth and therefore many meteorologists are worrying about changes in earth cllimate. To reduce the level of CO_2, we proposed the biological fixation of CO_2 via photosynthesis and established the microalgal system using the protozoan, *Euglena gracilis* Z. In our experiments, this organism proliferated in high CO_2 concentrations such as in exhausted gas from a electric power station in which higher plants or other algae could not survive. In addition, the *E. gracilis* contained very rich nutrients such as protein, unsatuated fatty acids and vitamins. However, there is little information available on the salt-tolerance of *E. gracilis*. This study is anattempt to elucidate the salt-tolerant mechanism of *E. gracilis* and to establish an application for the breeding of salt-tolerant plants or microalgae by using molecular biological techniques.

Proliferation of *E. gracilis* was inhibited at 100 mM NaCl concentration, but the cells could survive up to 250 mM NaCl. Under these conditions, *E. gracilis* changed its cell shape from tear drop to globular within 30 min and the packed-cell volume also decreased. These changes may due to adaptation to salt stress.

We found that trehalose, a disaccharide, was formed rapidly from paramylon, a reserve polysaccharide of this organism due to the salt conditions. ^{14}-C labelled paramylon converted stoichiometrically to the trehalose, suggesting *E. gracilis* forms trehalose as a compatible solute. The amount of trehalose changed in respond to changes in external salt concentrations.

From these results, we concluded *E. gracilis* has a salt-tolerant mechanism which produces trehalose as a compatible solute.