

Cycloheximide induces swelling of the perialgal vacuole membrane enclosing  
symbiotic *Chlorella vulgaris* and digestion of the algae  
in the ciliate *Paramecium bursaria*

Yuuki KODAMA<sup>1,2</sup> and Masahiro FUJISHIMA<sup>3</sup> (<sup>1</sup>Dept. Natural Sci. and Symbiosis, Grad. School of  
Sci. and Engineering, Yamaguchi Univ. <sup>2</sup>Res. Fellow of JSPS DC2, <sup>3</sup>Dept. Env. Sci. and Engineering,  
Grad. School of Sci. and Engineering, Yamaguchi Univ.)

**SUMMARY**

Cycloheximide inhibits protein synthesis in symbiotic *Chlorella* of the ciliate *Paramecium bursaria*, but hardly inhibits the host's protein synthesis. Treatment of the algae-bearing *Paramecium* cells with cycloheximide induces synchronous swelling of all perialgal vacuoles containing the symbiotic algae. The volume of the vacuoles increases about 25 times after 24 hours of treatment. The vacuoles then become condensed and can be stained by Gomori's staining; eventually, the algae in the vacuoles are digested. This phenomenon can only be induced under a fluorescent light and does not occur under a constant dark condition. On the other hand, even with the fluorescent light, this phenomenon cannot be induced if the paramecia are treated with cycloheximide in the presence of the photosynthesis inhibitor 3-(3,4-dichlorophenyl)-1,1-dimethylurea. These results indicate that the algal proteins synthesized during algal photosynthesis play some important role in preventing the expansion of the perialgal vacuole and to maintain an ability of the perialgal vacuole membrane to protect from the host's lysosomal fusion to the membrane.