

Study on the biosynthetic pathway of maltose produced by symbiotic *Chlorella* from Japanese *Paramecium bursaria*.

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SUMMARY

The endosymbiotic *Chlorella* cells in *Paramecium bursaria* provide photosynthate in the form of maltose to the host. The pathways for maltose production by the symbiont was thought to be dependent on light conditions; i.e., a normal degradation pathway from starch in the dark, and an unusual direct synthesis from two molecules of  $\alpha$ -glucose-1-phosphate catalyzed by maltose synthase in the light. To clarify the production pathway in light, enzymatic activity in cell-free extracts of the Japanese symbiont F36-ZK were studied. From the results of experiments using the corresponding substrates, activity of  $\beta$ -amylase and maltose phosphorylase was detected. The latter has been found in prokaryote cells and catalyzes a reversible conversion of maltose to glucose and  $\beta$ -glucose-1-phosphate. However, no maltose synthase activity was detectable in the cell-free extract. Furthermore, a crude  $\beta$ -amylase inhibitor prepared from *Daphne* leaves decreased the ratio of maltose to total photosynthate released by the symbiont. These results clearly indicate that the maltose is mainly produced by  $\beta$ -amylase from starch, and not by maltose synthase, in the light.