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Novel effects of D-glucose on the physiology of a *Paramecium* symbiont

Yutaka KATO and Nobutaka IMAMURA

(Department of Bioscience and Biotechnology, Ritsumeikan Univ.)

Glucose is a common nutrient, but sometimes it can work as an inducer or a signal. An endosymbiotic alga F36-ZK, isolated from Japanese *Paramecium bursaria* F36, grew faster in the presence of glucose, suggesting that glucose was a good nutrient. However, no glucose uptake was detectable in experiments using a radiotracer. On the other hand, it was found that glucose accelerated uptakes of several amino acids, such as L-Glu, L-Gln, L-Asp, L-Ser, L-Ala and L-Leu, approximately 2–5-fold in a mineral salt medium. A non-metabolizing glucose analogue, 3-OMG, also stimulated L-Ser uptake; this implies that glucose was not being used as an energy source. The effect was also observed in the presence of cycloheximide, indicating that the effect was not due to new synthesis of amino acid transporter. However, higher amino acid uptakes, but no stimulating effect of glucose were observed when Ca^{2+} and Mg^{2+} were absent, although amino acid uptake is generally increased in the presence of divalent cations in many organisms containing free-living *Chlorella*. These results suggest that divalent cations inhibit amino acid uptake, and glucose cancels the inhibiting effect of the cations. Glucose and divalent cations seems to have roles as regulators of the symbiont's amino acid uptake in *Paramecium* symbiosis.