Amino acid transport between *Paramecium bursaria* and its symbiotic *Chlorella*

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SUMMARY

Our previous studies of the Japanese symbiotic *Chlorella* F36-ZK suggested that *Paramecium bursaria* supplies amino acids to its symbiont. To evaluate this, amino acid permeability of the perialgal vacuole (PV) membrane, which is a barrier between the host and its symbiotic *Chlorella*, was investigated. Because symbiotic algal amino acid transport was apparently stopped immediately by infection with a chlorovirus, this phenomenon was used to identify *Chlorella* enclosed within an intact PV membrane. Symbiotic *Chlorella* cells lacking, or with incomplete, PV membranes became infected with the chlorovirus and could not import any amino acids, while those with a complete PV membrane were protected from infection and could import amino acids. The experimental results revealed that at least Arg and Gln could permeate the PV membrane. Furthermore, re-infection experiments using aposymbiotic *P. bursaria* cells and an Arg transport–deficient *Chlorella* mutant, which was obtained from canavanine-resistant strains, showed quite a low success rate of reconstruction of the symbiotic relationship. It is concluded that the host supplies Arg as a nitrogen carrier to its symbiont.