

# Green Paramecia as an Evolutionary Winner of Oxidative Symbiosis: A Hypothesis and Supportive Data

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A single cell of the green paramecia (*Paramecium bursaria*) harbors several hundreds of endo-symbiotic *Chlorella*-like algae in its cytoplasm. Removal of algae from the host organism and re-association of ex-symbiotic host paramecia with ex-symbiotic algae can be experimentally demonstrated in the laboratory. However, the mechanism precisely governing the alga-protozoan association is not fully understood, and the origin of symbiosis in the evolutionary view has not been given. Here, we propose the possible biochemical models (models 1 and 2) explaining the co-evolution between *Paramecium* species and algal symbionts by pointing out that algal photosynthesis in the host paramecia plays a dual role providing the energy source and the risk of oxidative damage to the host. Model 1 lays stress on the correlation between the (re)greening ability of the paramecia and the tolerance to oxidative stress whereas model 2 emphasizes the cause of evolutionary selection leading to the emergence of *Paramecium* species tolerant against reactive oxygen species.

*Key words:* Green Paramecia, Oxidative Stress, Symbiosis