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*A Model of Photoacclimation in Phytoplankton with Optimal Resource Allocation*

We develop a model of the energy budget of phytoplankton using a feedback process to regulate the amount of light-harvesting and carbon-synthesis apparatus and incorporate evolutionary optimization to identify resource allocation strategies, photosynthetic and growth rates. We derive the commonly used saturating photosynthetic-irradiance curves, showing how they are related to our mechanistic parameters. An analytical and numerical comparison of the performance of specialists—grown at specific irradiance—is presented. A specialist is also compared with a generalist, where the latter is characterized as capable of promptly adjusting to the prevailing irradiance.