



Light absorption and size scaling of light-limited metabolism in marine diatoms

Finkel, Zoe Vanessa

Limnol. Oceanogr., 46(1), 2001, 86-94 | DOI: 10.4319/lo.2001.46.1.0086

ABSTRACT: Previous studies have found that the size-scaling exponent of metabolic rates in unicellular algae often deviates from the exponent of $-1/4$ usually found for heterotrophs. This study confirms a significant linear relationship between log cell volume (mm^3) and log intrinsic growth rate (h^{-1}), carbon-normalized photosynthetic capacity and performance (h^{-1}), and carbon-normalized respiratory rate (h^{-1}) for eight marine centric diatoms under nutrient-saturated, light-limited conditions. The intrinsic growth rate and carbon-normalized respiratory rate have size-scaling exponents not significantly different from $-1/4$, whereas the carbon-specific photosynthetic rates deviate from $-1/4$. The size dependence of the optical absorption cross section ($\text{m}^2 \text{mg chlorophyll a}^{-1}$) due to the package effect provides a mechanistic model that explains the anomalous size scaling of the anabolic rates of unicellular phytoplankton.

Article Links

[Download Full-text PDF](#)

[Return to Table of Contents](#)

Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for \$10 per article. All L&O articles are moved into Open Access after three years.