05.07.2024

Cover letter

Dear Editor

Prof. David J. Garbary,

We hereby submit a manuscript for consideration for publication in your special issue of 'Botany' to commemorate the UN International Decade of the Oceans, on the theme of "Advances in ocean function".

The picocyanobacterial genus *Synechococcus*, one of the most abundant primary producers in marine ecosystems, comprises a diversity of strains of differing pigmentations, thriving across diverse niches. Oxygen Minimum Zones with low [O2] are now expanding in both open ocean and coastal habitats. We found that PhycoCyanin- and PhycoErythrin-rich *Synechococcus* strains both grow well under 2.5 µM [O2], characteristic of Oxygen Minimum Zones, across a range of spectral wavebands from 405 – 730 nm. The PhycoErythrin-rich *Synechococcus*, indeed grew faster under 2.5 µM [O2] than under air-saturated levels of [O2], partly because it achieved a higher yield of growth per electron flux. PhycoErythrin-rich *Synechococcus* are currently typically found at greater depths, and lower light, than are PhycoCyanin-rich strains, but we suggest that the PhycoErythrin-rich strains are actually limited to lower light by an interaction between light and full air-saturated [O2]. With expanding Oxygen Minimum Zones PhycoErythrin-rich strains will likely exploit higher light niches, across a wider spectral range.

The findings of this study are helpful for further research on picocyanobacteria ecophysiology and modelling of range changes under climate change.

Sincerely,

Douglas A. Campbell and co-authors