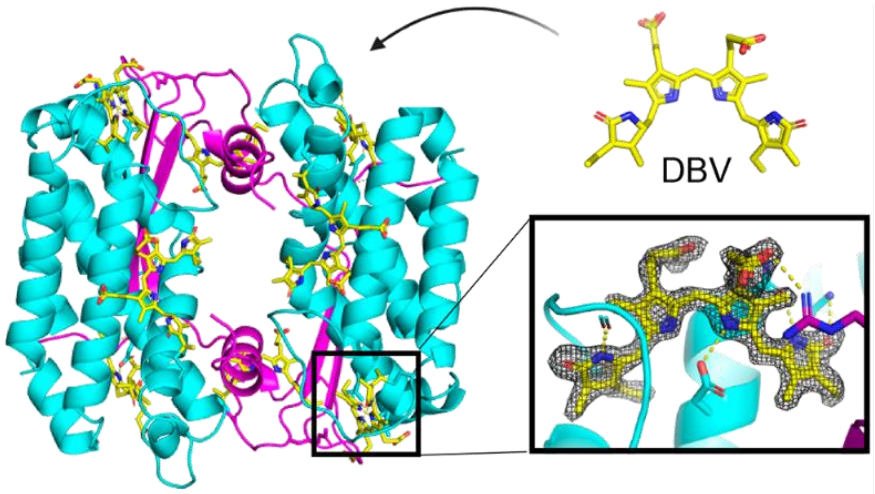
17-ID-1 AMX

17-ID-2 FMX

# How Do Algae Survive Under Low Light Conditions?




*Crystal structure for photoacclimated PC577. The protein is in purple and cyan, and the chromophores are shown in yellow. There is no significant difference in crystal structure or geometry of the chromophore binding pocket from the native PC577. Photoacclimation was achieved via changes in the chromophore composition bound to the protein.*

## Scientific Achievement

Scientists show that light-adaptation of certain algae occurs via chromophore tuning, and not a result of sequence or structural changes in the light-harvesting antennae proteins.

## Significance and Impact

This research provides atomic-level insight into how algae have evolved to regulate photosynthesis under varying light conditions.

## Research Details

- X-ray crystallography was performed on isolated native and photoacclimated phycobiliproteins from two cryptophyte algae at the NSLS-II AMX and FMX beamlines.
- Transient absorption spectroscopy measurements were used to characterize the light-harvesting function.
- The combined results showed the chromophores bound to the β subunits of the antennae proteins were responsible for the photoacclimation.

L.C. Spangler, M. Yu, P.D. Jeffrey, G.D. Scholes. Controllable Phycobilin Modification: An Alternative Photoacclimation Response in Cryptophyte Algae. *ACS Cent. Sci.* **8 (3)**, 340–350 (2022).

*Work was performed in part at Brookhaven National Laboratory.*