

**Light Harvesting by Carotenoids:
Peridinin-Chlorophyll-Protein (PCP)
from *Amphidinium carterae***
Structural Relation to Proteins with Globin Fold

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Dinoflagellates contribute a major part of the plankton on earth. We have recently solved by x-ray crystallography [1] at 2.0Å resolution the structure of peridinin-chlorophyll-protein (PCP), a water-soluble light-harvesting complex, which has a blue-green absorbing carotenoid as its main pigment, and is present in most photosynthetic dinoflagellates. PCP forms a flat non-crystallographic trimer, which we believe is the photosynthetically active form. The PCP polypeptide (312 residues) has the shape of the hull of a ship (Fig. 1) enclosing two lipid, eight peridinin and two chlorophyll *a* molecules. Each monomer is composed of a pseudosymmetry-related N- and C-terminal half of eight helices each adopting a peculiar topology which we found to be similar to the globin fold [2]. The structural basis for efficient excitonic energy transfer from peridinin to chlorophyll is found in the clustering at van der Waals distance of peridinins around the chlorophylls.

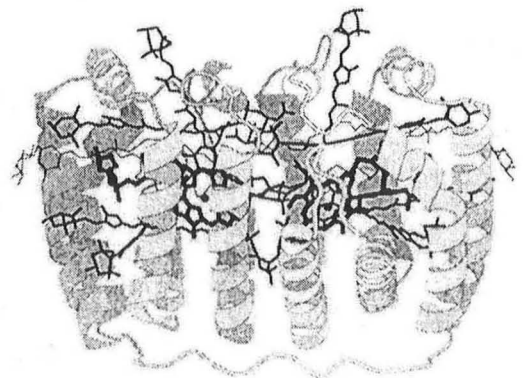


Figure 1: Structure of a PCP monomer (helices, light gray, prosthetic groups, dark)

References:

- [1] Hofmann, E., Wrench, P.M., Sharples, F.P., Hiller, R.G., Welte, W. and Diederichs, K. (1996): Structural basis of light harvesting by carotenoids: peridinin-chlorophyll-protein from *Amphidinium carterae*. *Science* **272**, 1788-1791
- [2] K. Diederichs and E. Hofmann (1997) NATO Meeting Series "New Methods for the Study of Molecular Aggregates", K.G. Standing (ed.), in the press.