

Distributions of aerobic, anoxygenic phototrophic (AAP) bacteria in the N. Atlantic

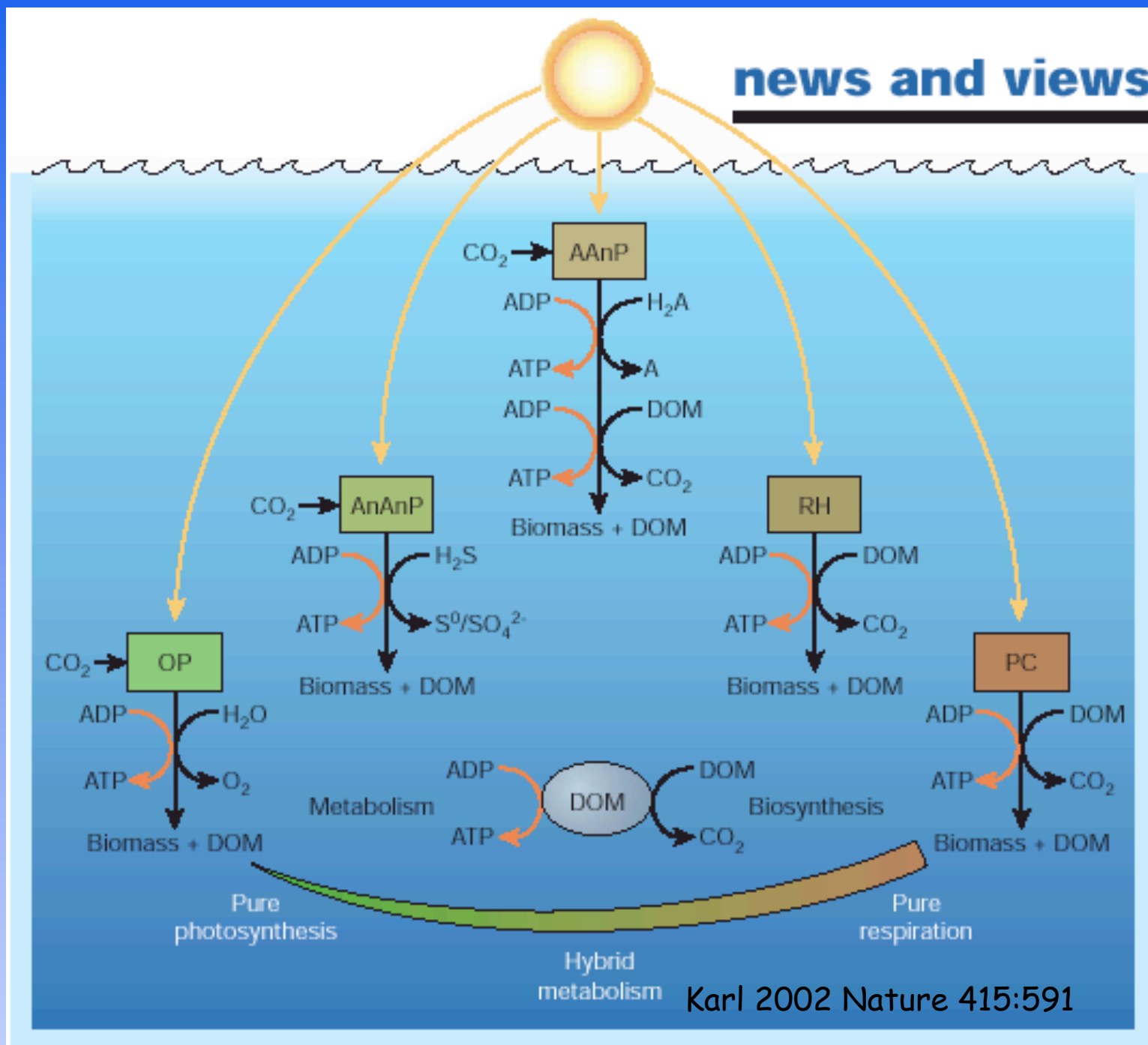
Ilana Gilg, Ed Thier, Nicole Poulton, Ralf Goericke

Sieracki et al. 2006. Limnol. Oceanogr. 51:38-46

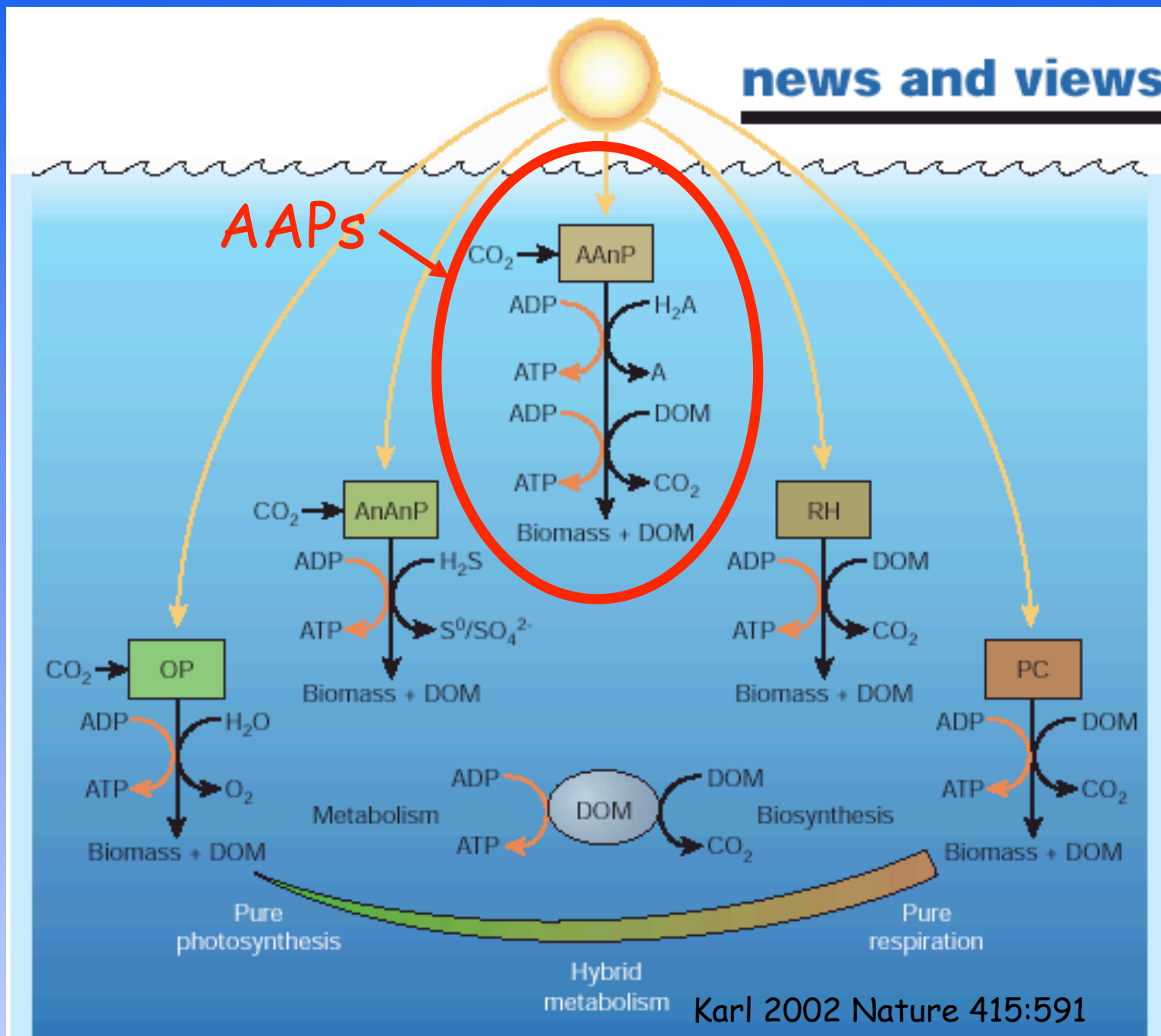
What are AAP bacteria??

- discovered to be widespread in ocean by Kolber et al. 2000
- contain bacteriochlorophyll
- genes found across wide groups of bacteria
- expected to be found in anoxic environments
- photosynthesis does not produce oxygen, uses alternative reductant source (organic matter?)

"New" ocean bacterial photo-metabolisms



"New" ocean bacterial photo-metabolisms

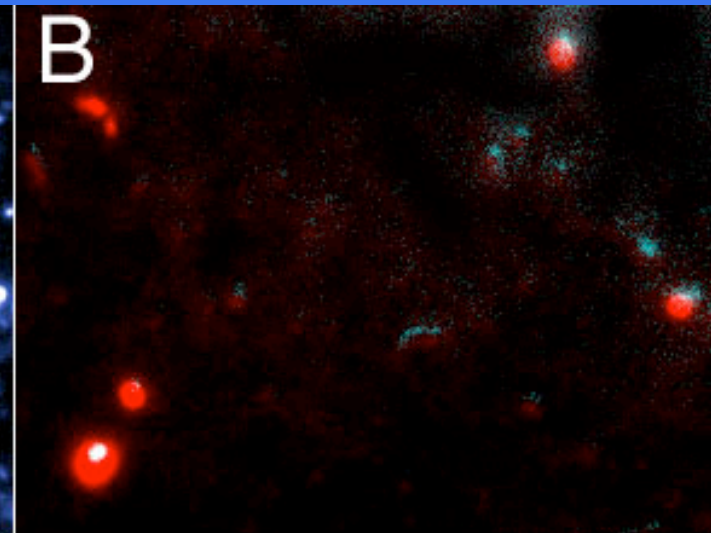
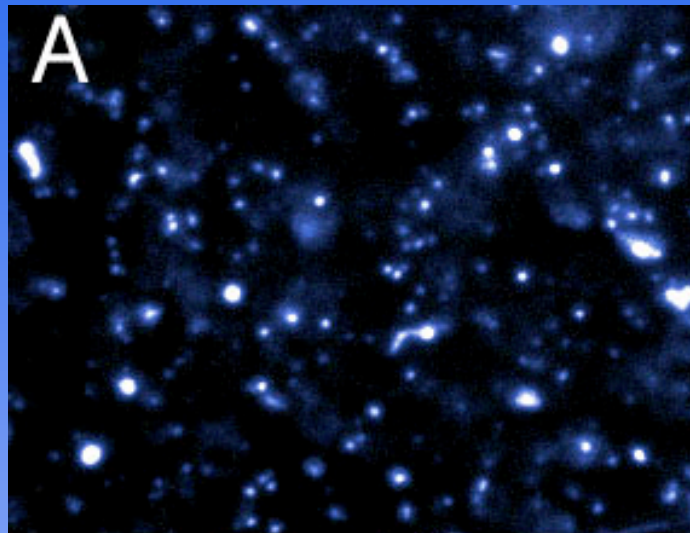


Aerobic Anoxygenic Phototrophs

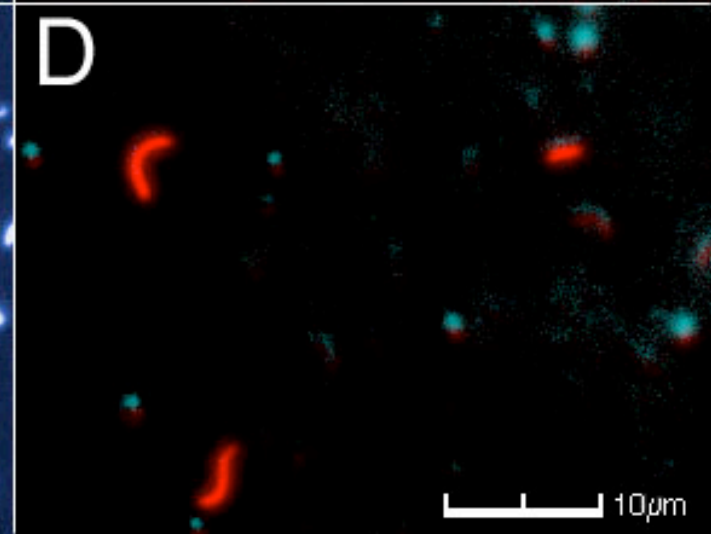
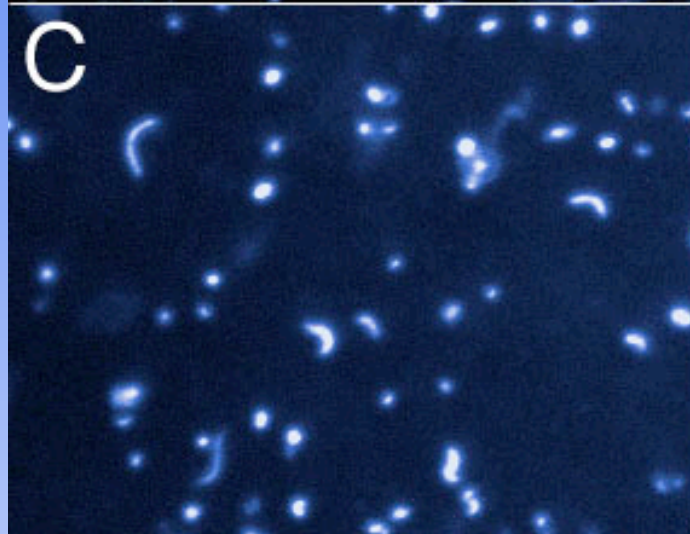
DAPI - UV

BacChl - IR

Georges
Bank

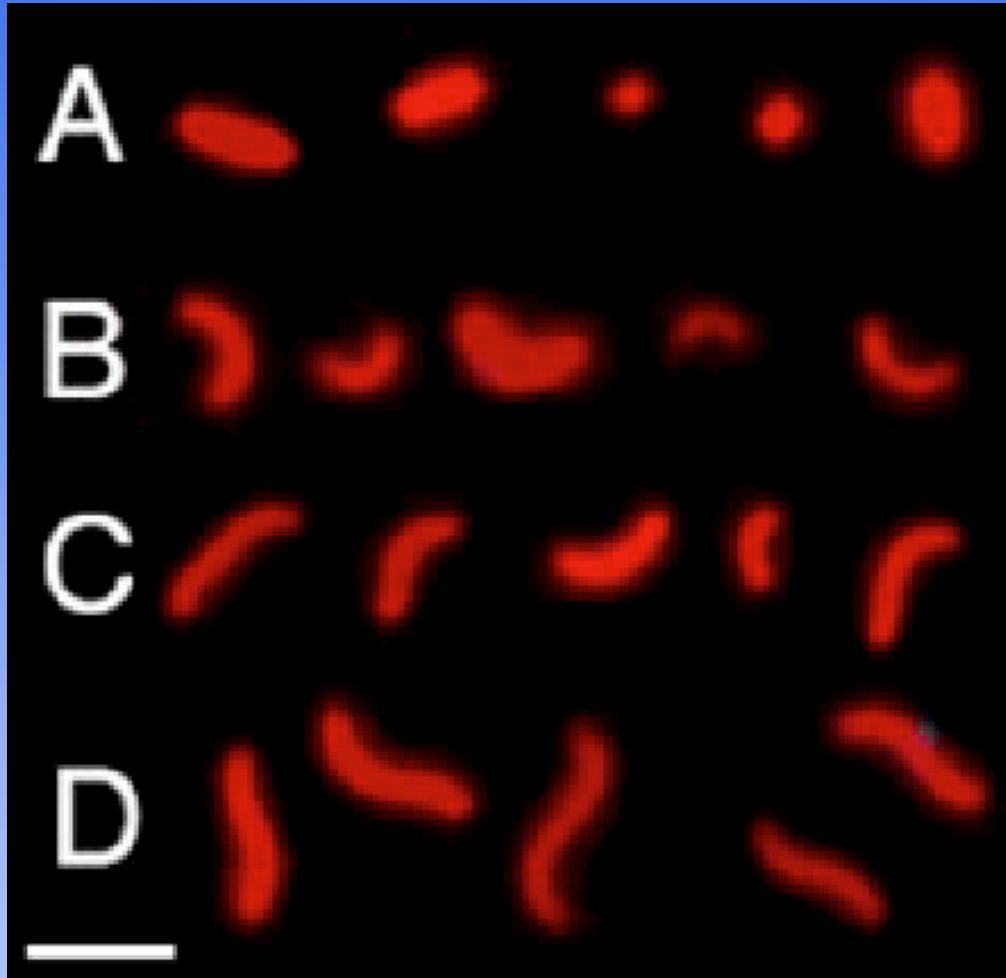


Sargasso
Sea



Sieracki ME, et al. (2006) Distribution of planktonic aerobic anoxygenic photoheterotrophic bacteria in the northwest Atlantic. *Limnol Oceanogr* 51:38-46

Diverse AAP Morphologies

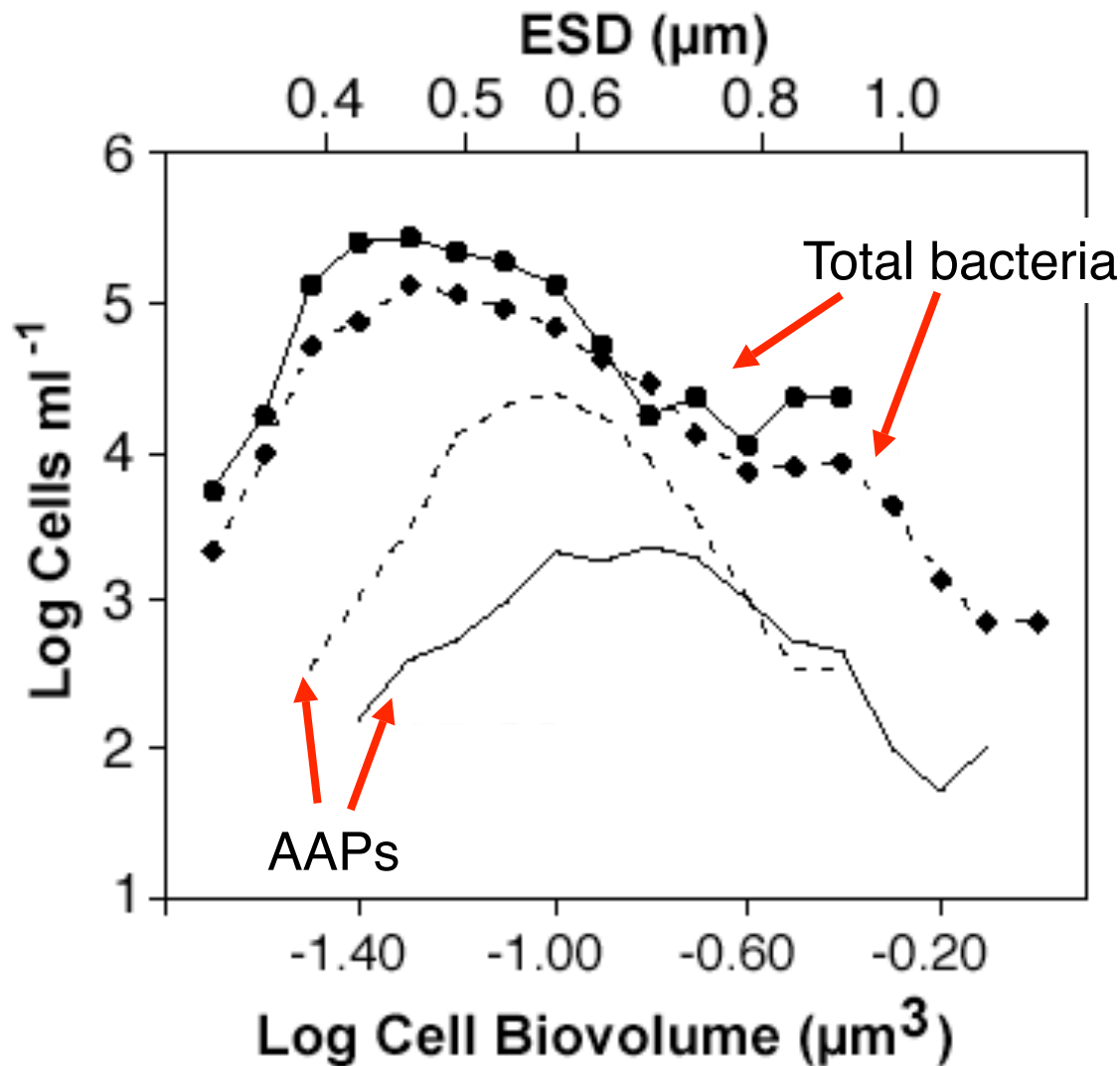


Rods and cocci

Vibrios

Spirilla

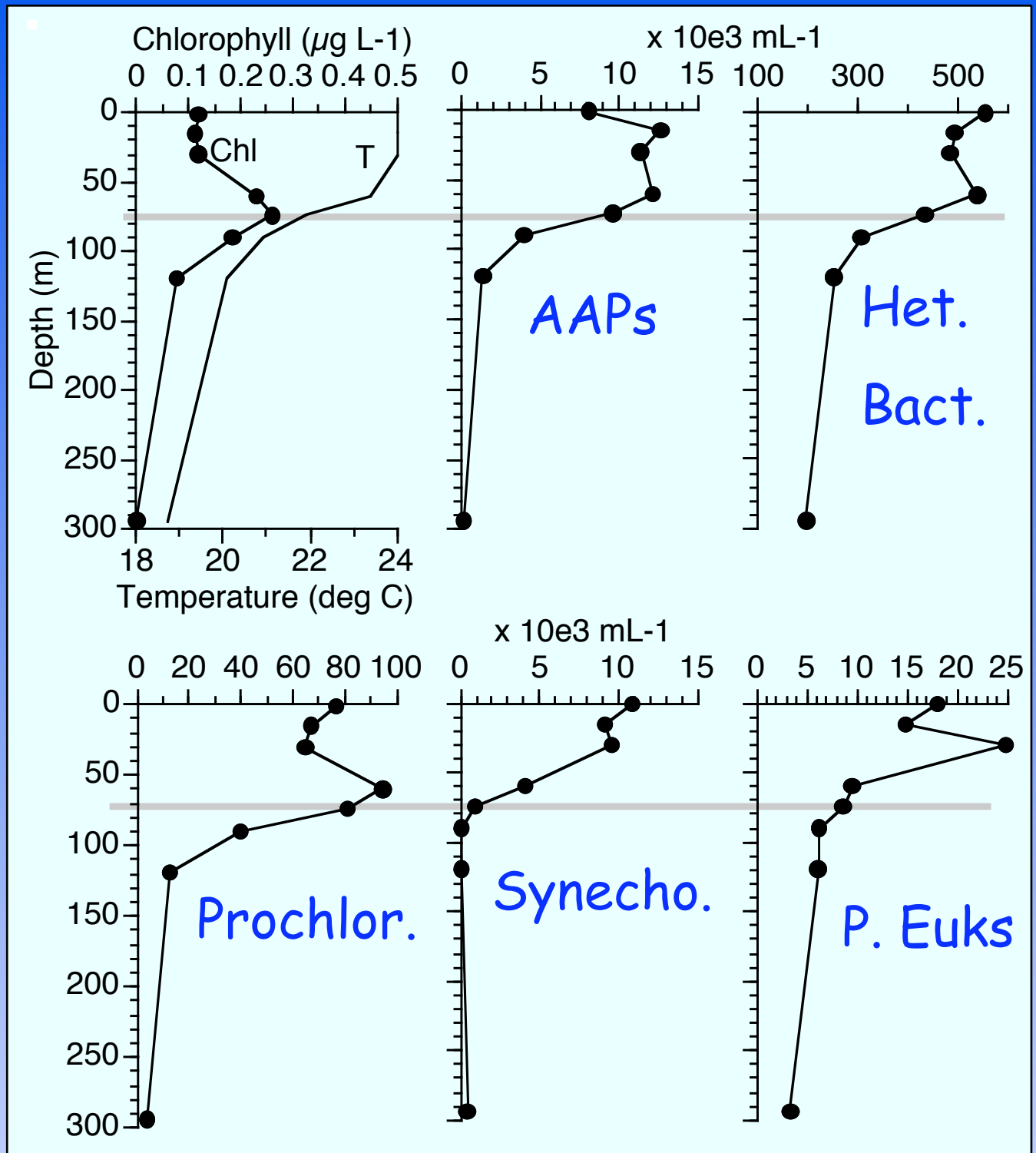
Size Spectra



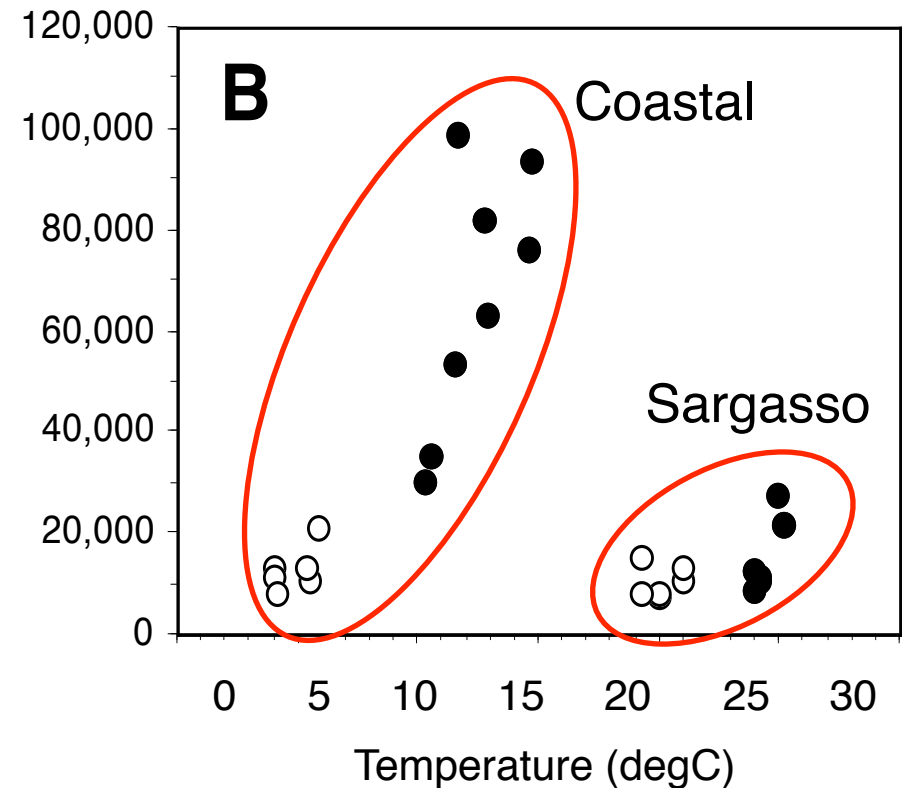
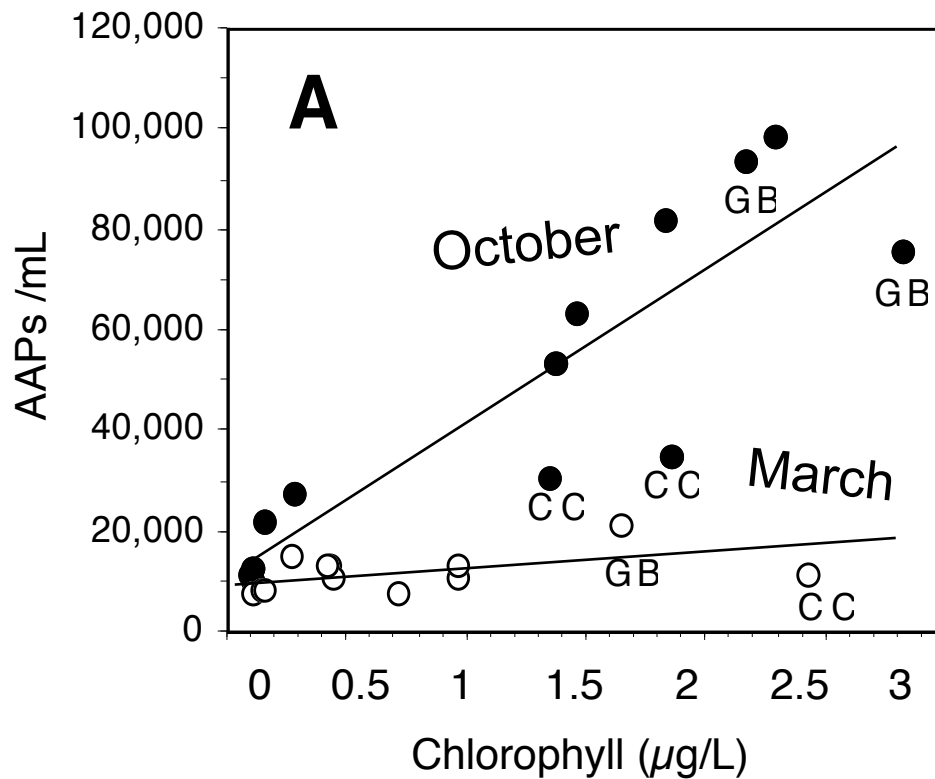
AAPs are larger than the average marine bacteria

Sargasso Sea
October
Vertical Profile

Microbial
Community



AAPs are more abundant with higher chlorophyll and temperatures



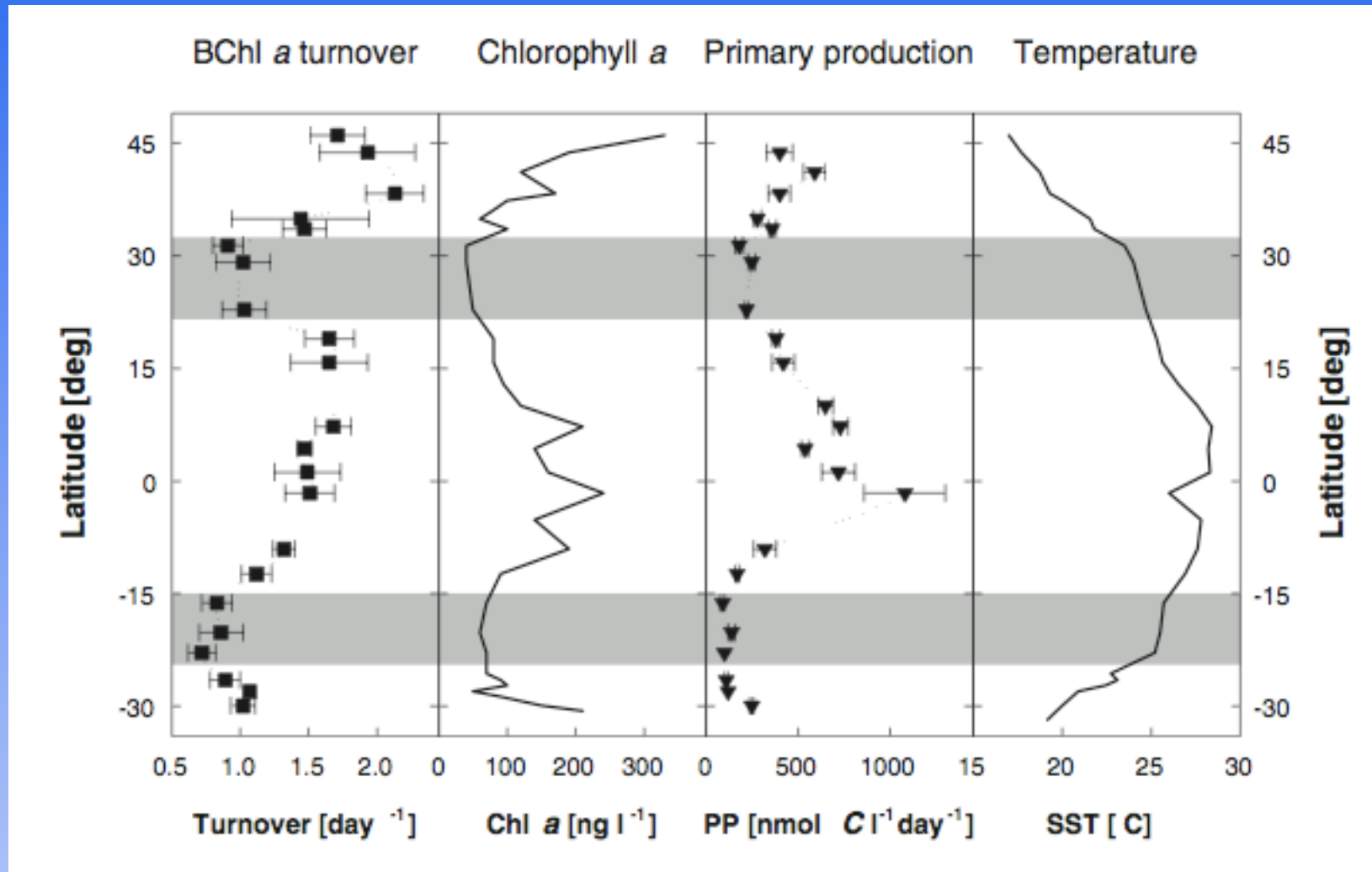
Summary of our AAP results

- AAPs are larger (more biomass per cell) than the average bacteria
- AAPs have diverse morphologies, especially in the open ocean
- AAPs are more abundant in productive, coastal waters than in the open ocean - they correlate with primary producers
- AAPs are a higher percentage of the total bacterial biomass in productive, coastal waters (2-12%) than in the open ocean (2-5%)

AAP Ecology

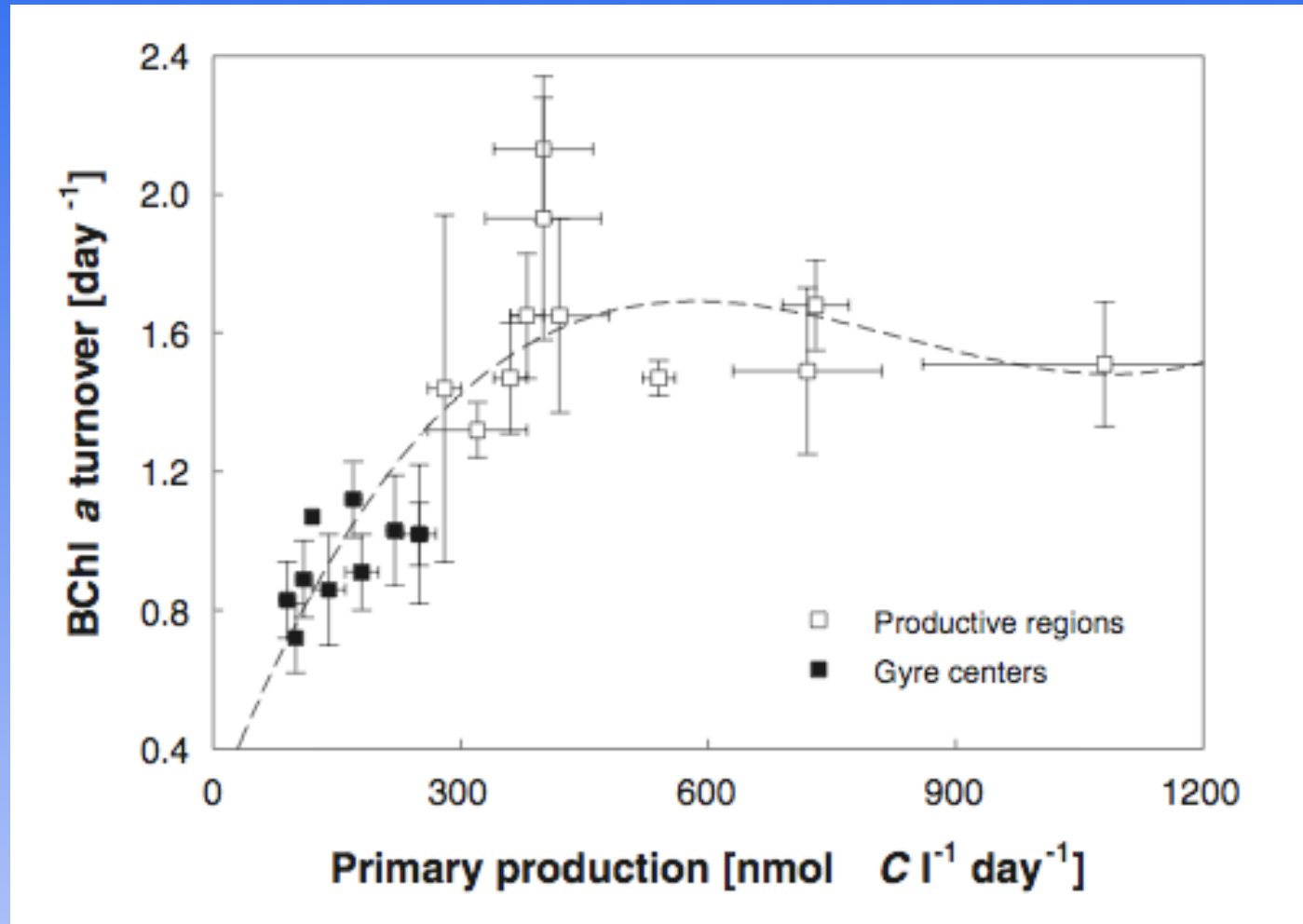
- ... SO: AAP cell and biomass distributions do not support the hypothesis that these cells are specifically adapted to the low nutrient, open ocean environment
- Analogous to mixotrophic eukaryotes
 - Larger AAP cells may be more active, and/or avoid grazing in open ocean

AAP activity along the Atlantic meridional transect (AMT16, May-Jun 2005)



Koblizek M, Masin M, Ras J, Poulton AJ, Prasil O (2007) Rapid growth rates of aerobic anoxygenic phototrophs in the ocean. *Environmental Microbiology* 9:2401-2406

AAP growth vs. primary production



Koblizek M, Masin M, Ras J, Poulton AJ, Prasil O (2007) Rapid growth rates of aerobic anoxygenic phototrophs in the ocean. *Environmental Microbiology* 9:2401-2406

Photoheterotrophs: potential light-accelerated carbon shunt in the microbial food web

