

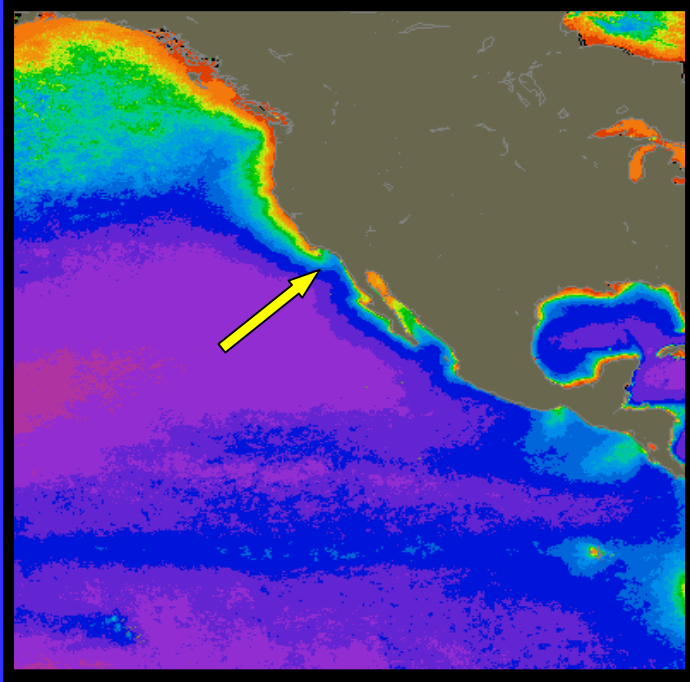
**Assessing the dynamics and  
ecology of marine picoplankton:  
the importance of the eukaryotic  
component**

**Alexandra Z. Worden**

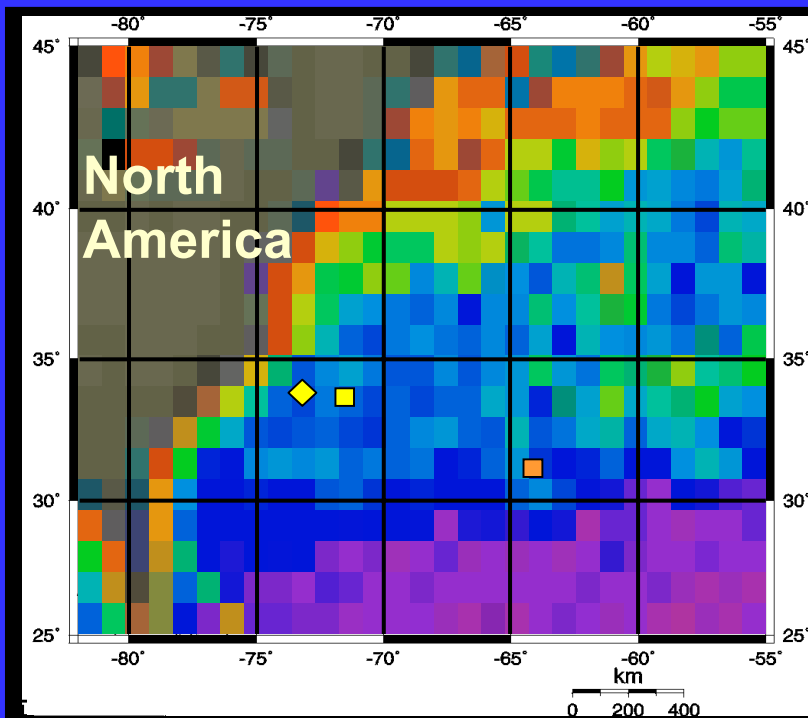
**Scripps Institution of Oceanography**

- **The study sites**
- **The photosynthetic picoplankton**
  - seasonal dynamics
  - growth and grazing mortality
  - carbon contribution
- **Defining the eukaryotic component**
  - Culture work with a photosynthetic picoeukaryote
  - overall diversity at the study sites

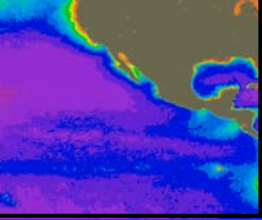
# The study sites



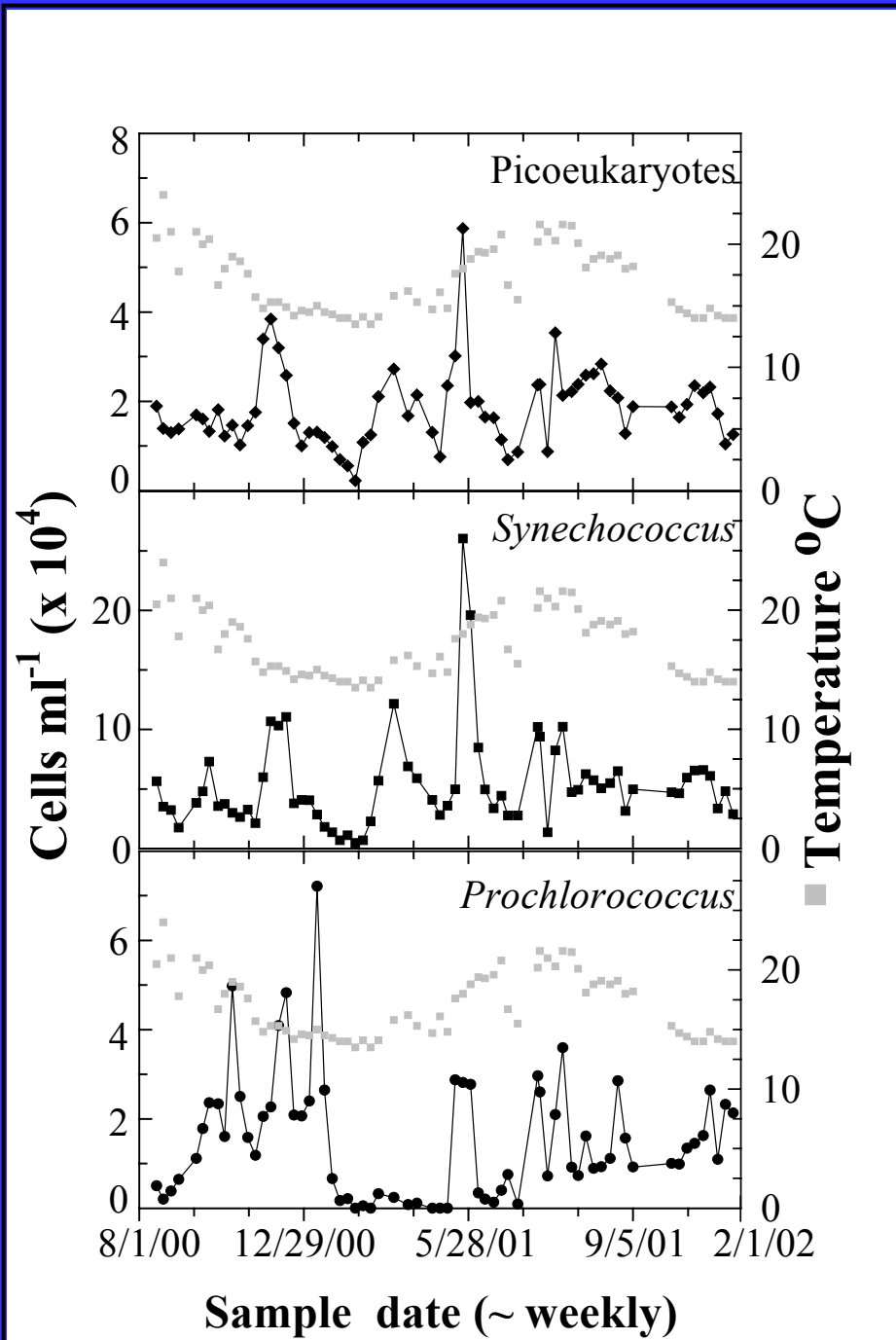
**Pacific Ocean:  
Southern  
California Bight**



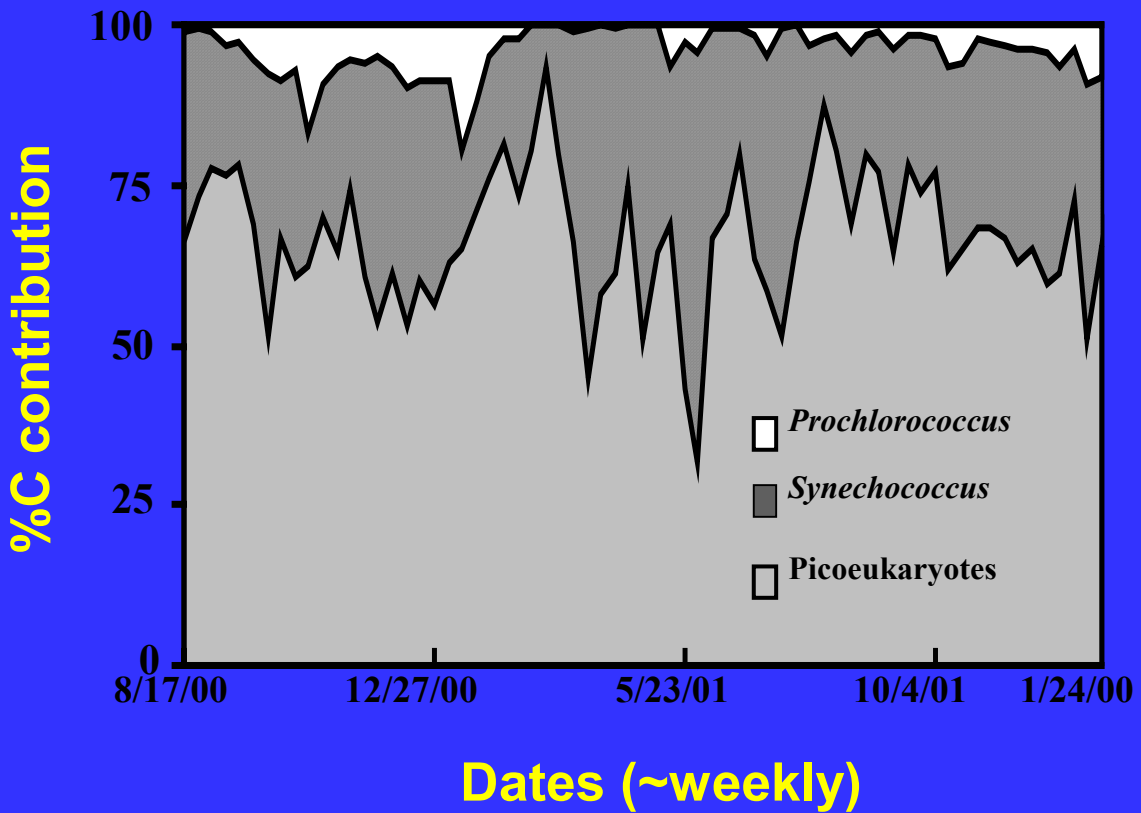
**Atlantic  
Ocean:  
Sargasso Sea**



# Photosynthetic picoplankton abundance



# Standing stock carbon biomass

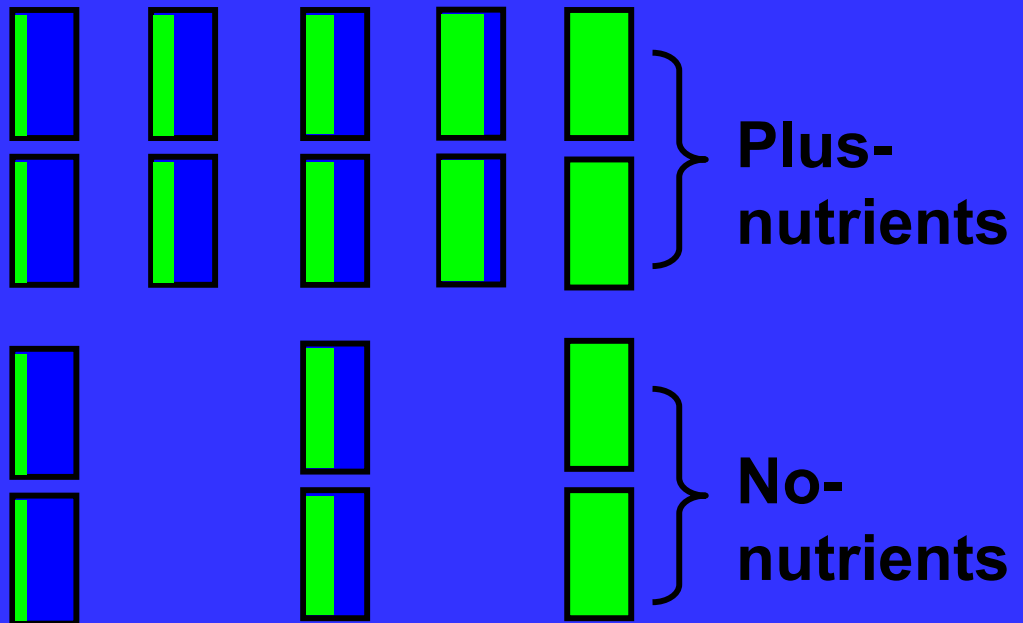


# Dilution experiments - experimental Setup

 - Unfiltered Seawater  
 - Filtered Seawater

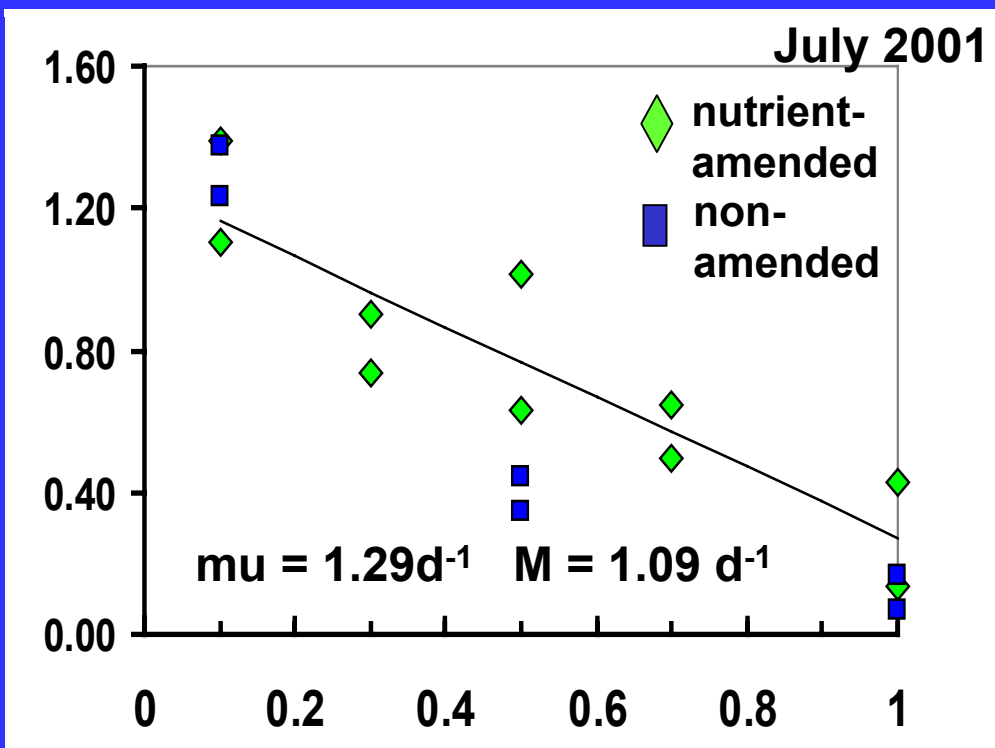
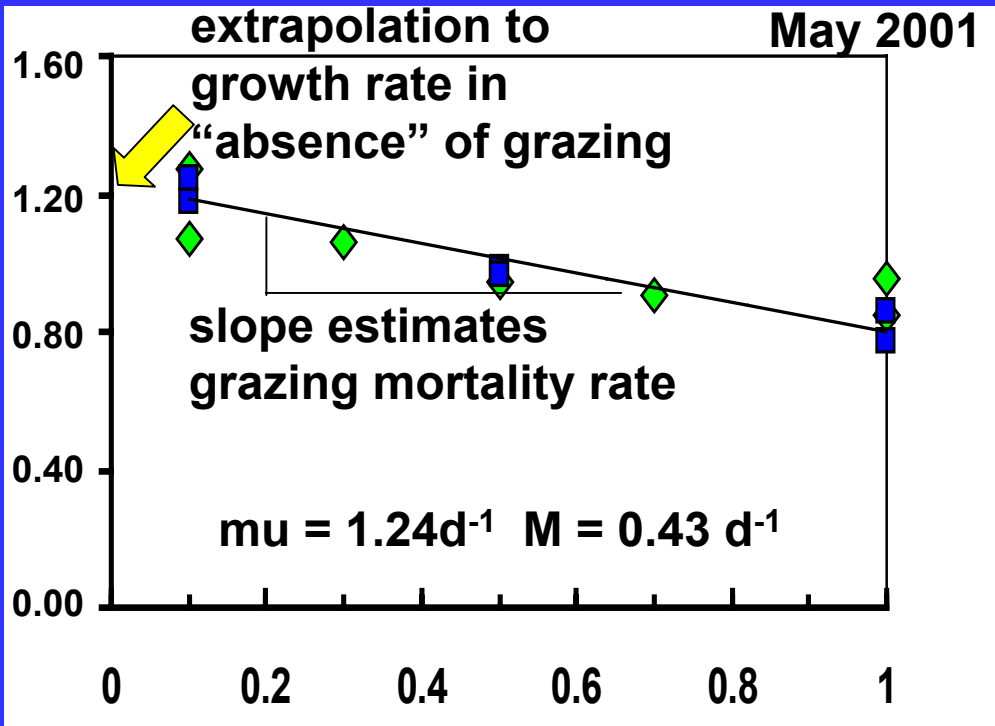
**% Unfiltered SW:**

10% 30% 50% 70% 100%



# Interpreting dilution experiments

Net growth rate ( $d^{-1}$ )

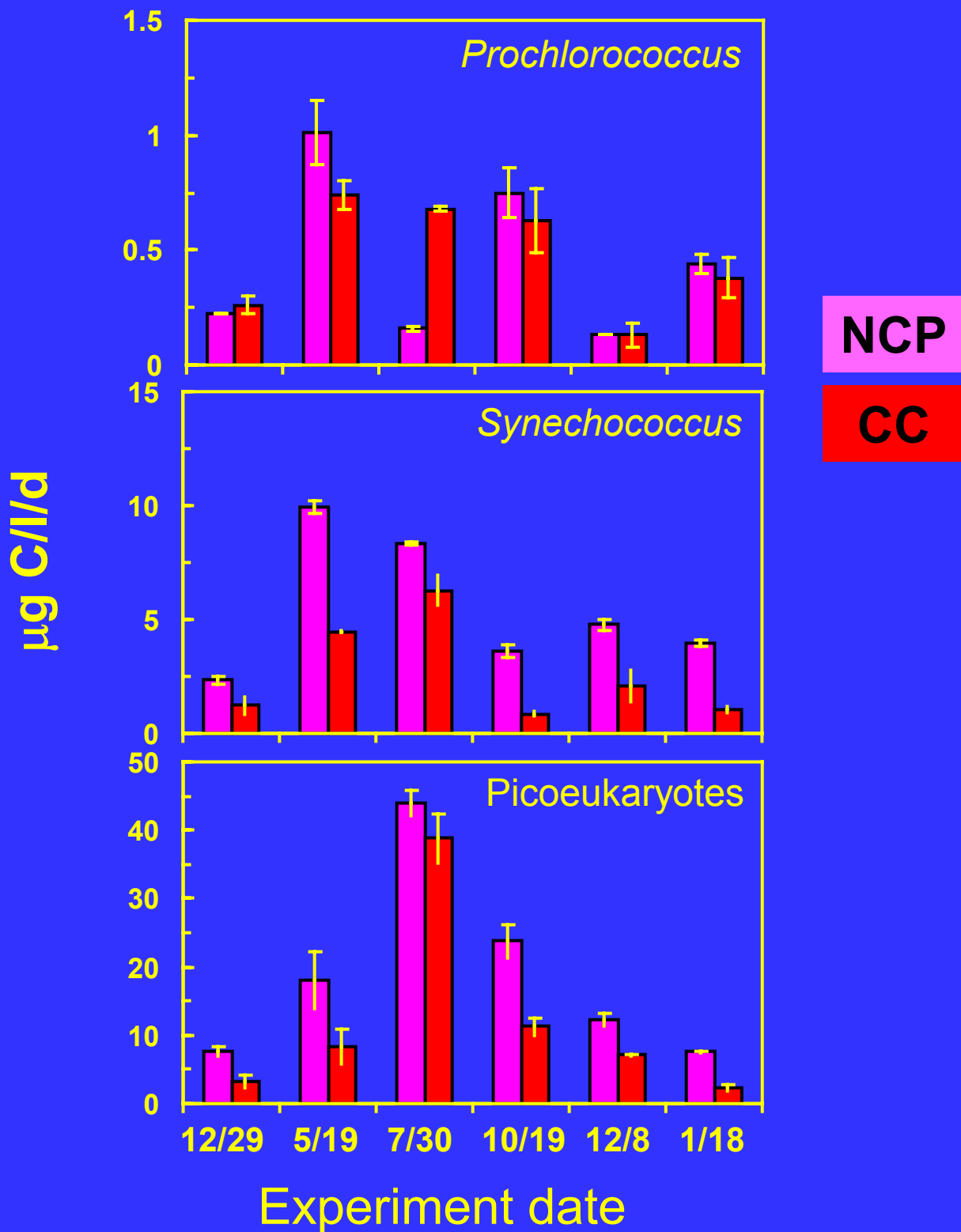


← Progressively more dilute sea water

# Growth and grazing mortality

Experiment	<i>Prochlorococcus</i>			
	Date	cells	mu	m
	m/d/y	(ml <sup>-1</sup> )	(d <sup>-1</sup> )	(d <sup>-1</sup> )
	12/29/00	1.1x10 <sup>4</sup>	0.30	-0.36
	19 May 2001	3.2x10 <sup>4</sup>	0.48	-0.33
	30 July 2001	3.1x10 <sup>4</sup>	0.09*	-0.35
	10/19/01	2.5x10 <sup>4</sup>	0.46	-0.48
	12/8/01	0.76x10 <sup>4</sup>	0.27	-0.34
	1/18/02	1.6x10 <sup>4</sup>	0.35	-0.30
<i>Synechococcus</i>				
	12/29/00	3.3x10 <sup>4</sup>	0.52	-0.27
	19 May 2001	8.2x10 <sup>4</sup>	0.86	-0.31
	30 July 2001	10.3x10 <sup>4</sup>	0.69	-0.39
	10/19/01	3.8x10 <sup>4</sup>	0.77	-0.15
	12/8/01	6.5x10 <sup>4</sup>	0.56	-0.22
	1/18/02	4.2x10 <sup>4</sup>	0.58	-0.14
<i>Picoeukaryotes</i>				
	12/29/00	1.6x10 <sup>4</sup>	0.75	-0.27
	19 May 2001	3.0x10 <sup>4</sup>	1.24	-0.43
	30 July 2001	2.2x10 <sup>4</sup>	1.29	-1.09
	10/19/01	2.6x10 <sup>4</sup>	1.22	-0.42
	12/8/01	2.5x10 <sup>4</sup>	0.75	-0.34
	1/18/02	1.1x10 <sup>4</sup>	0.71	-0.17

# Trophic transfer of carbon



# S10 *Ostreococcus* Isolate

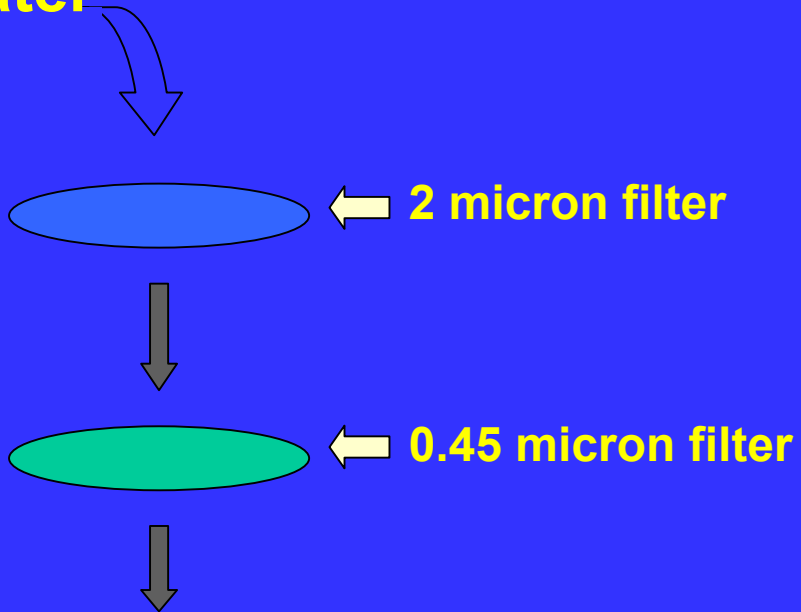


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0.7 microns

# Diversity based on molecular phylogeny

Sea water



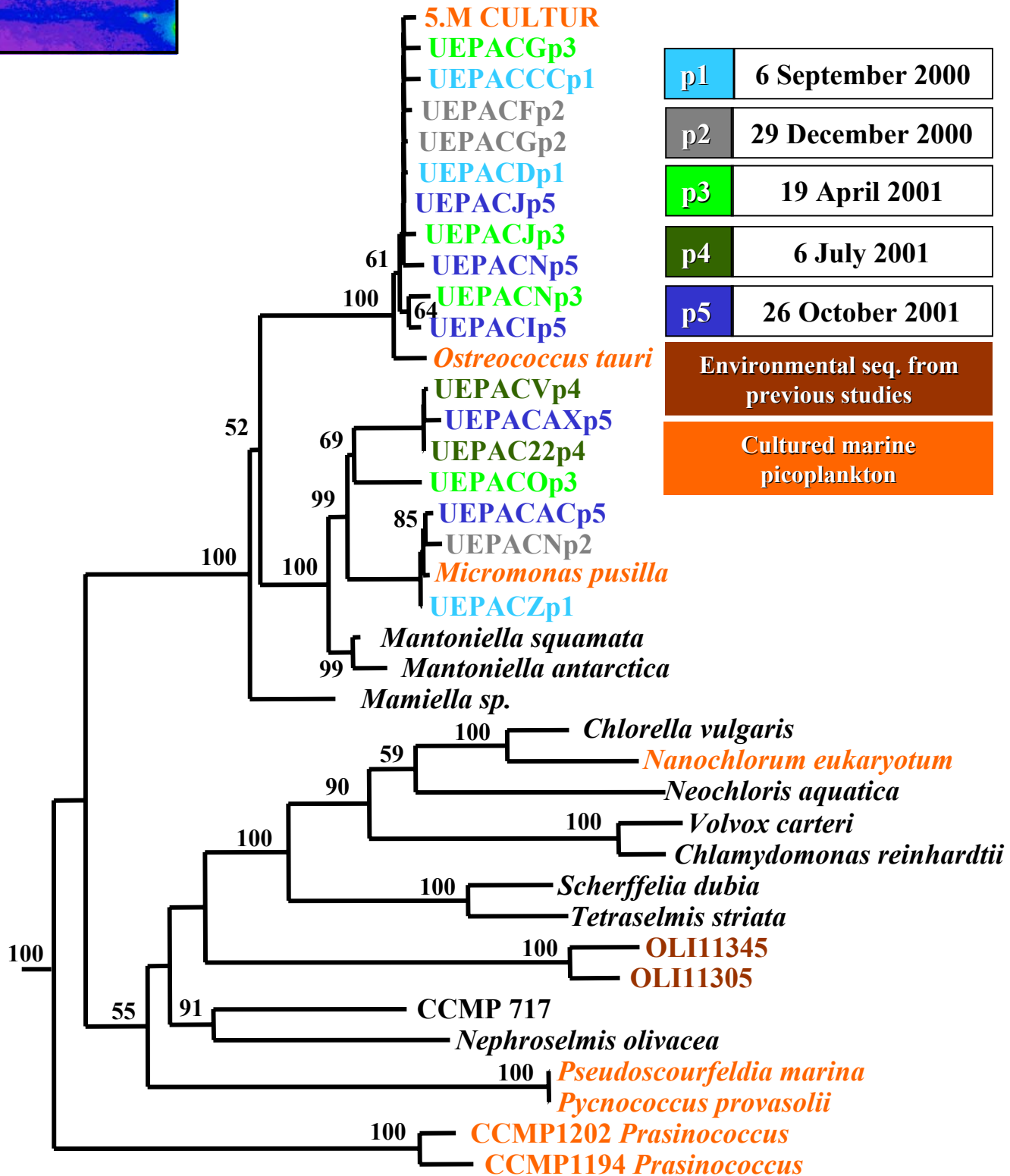
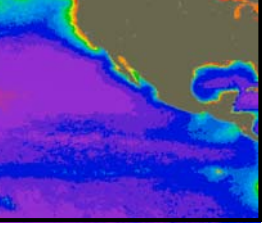
DNA extraction

PCR Amplification of  
18S rRNA gene

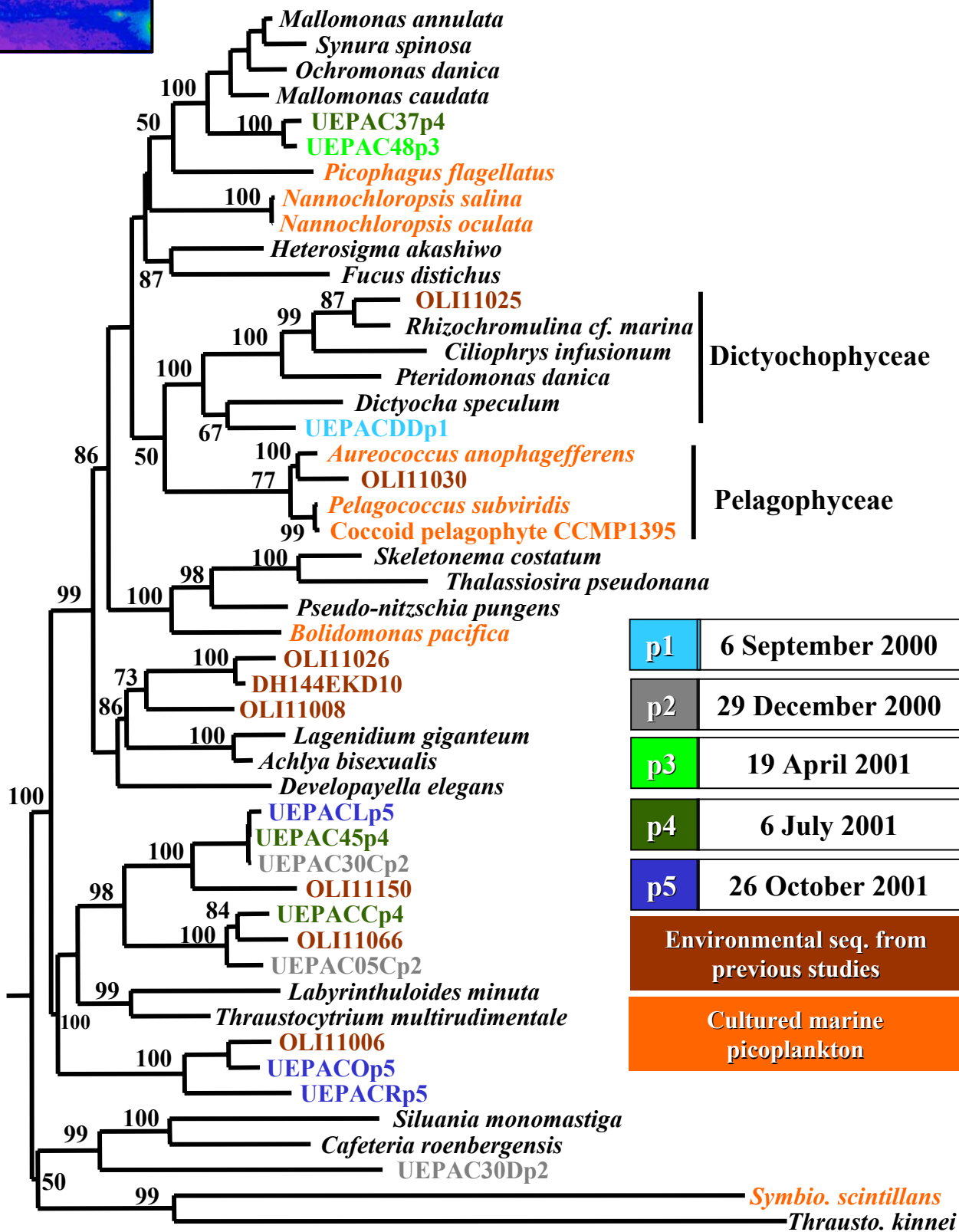
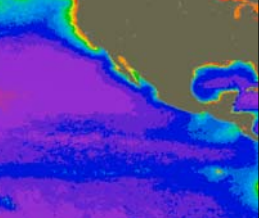
Cloning of 18S product

Restriction → Sequencing ~ 1800 bp

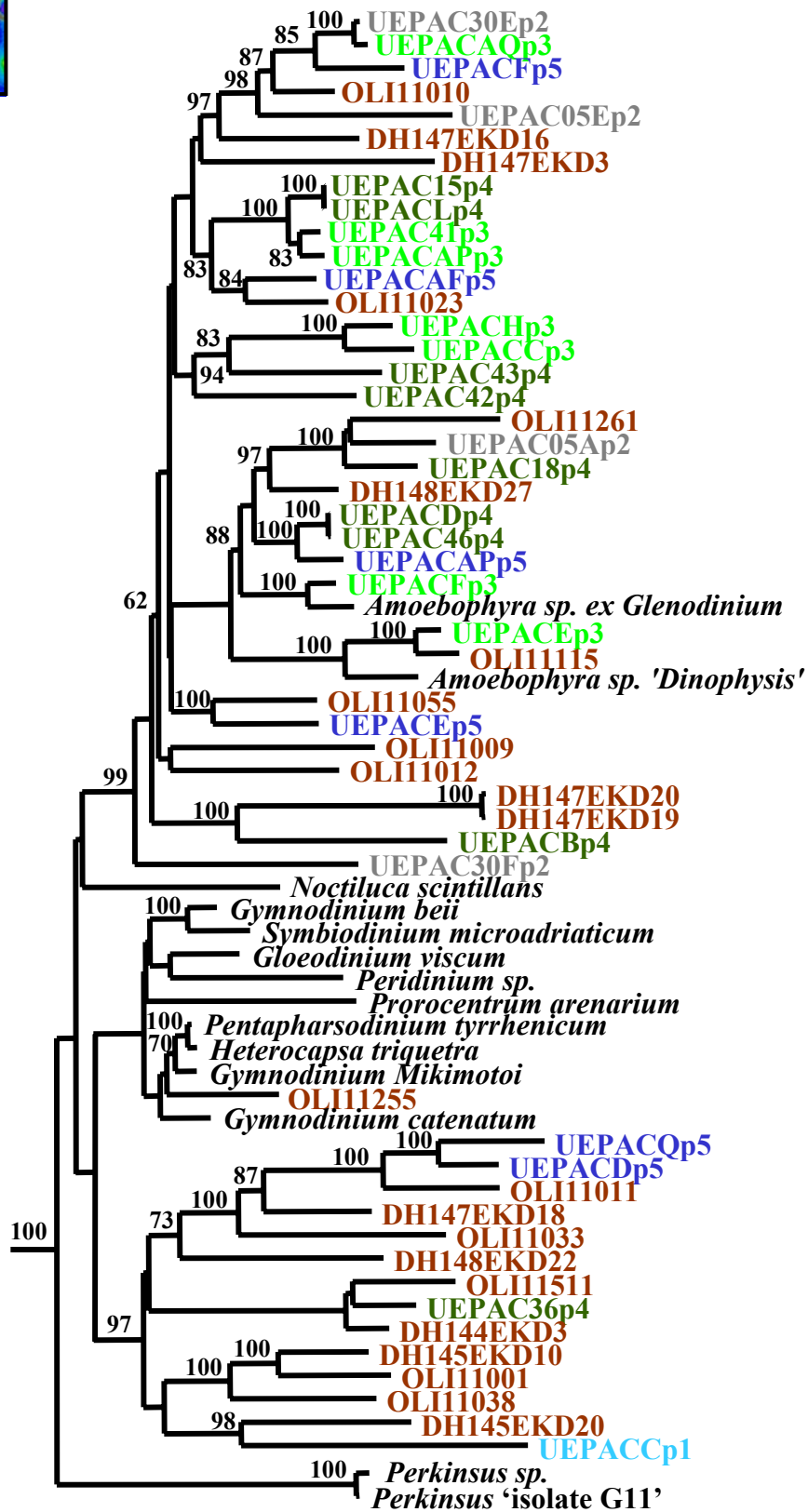
# Green Algae



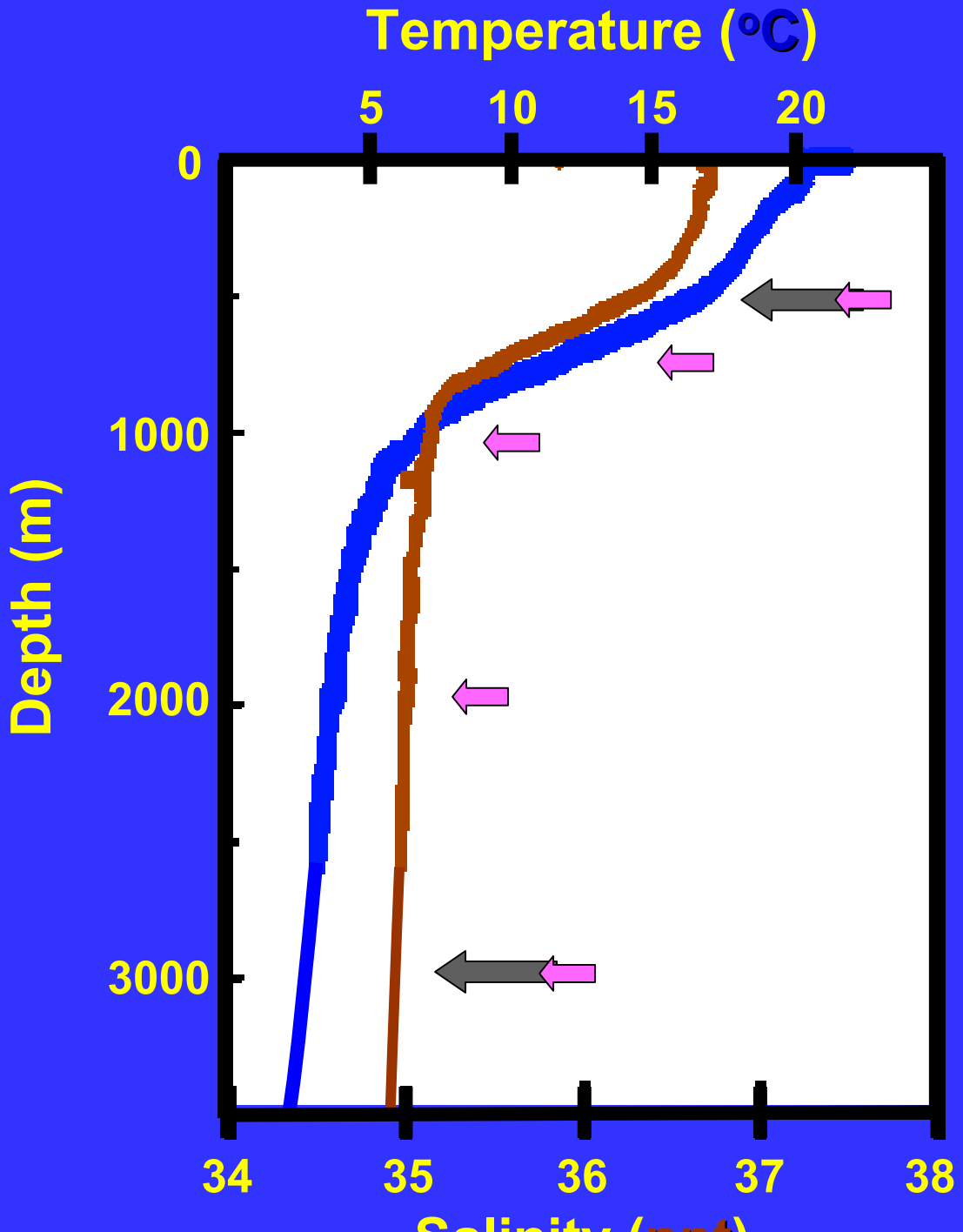
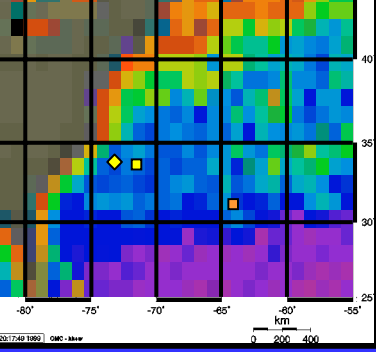
# Stramenopiles

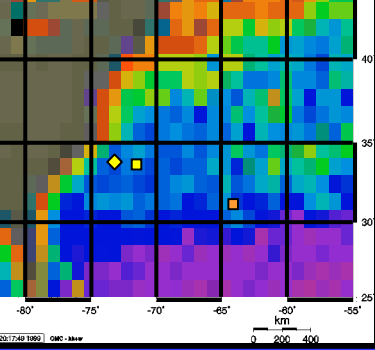


# Alveolates



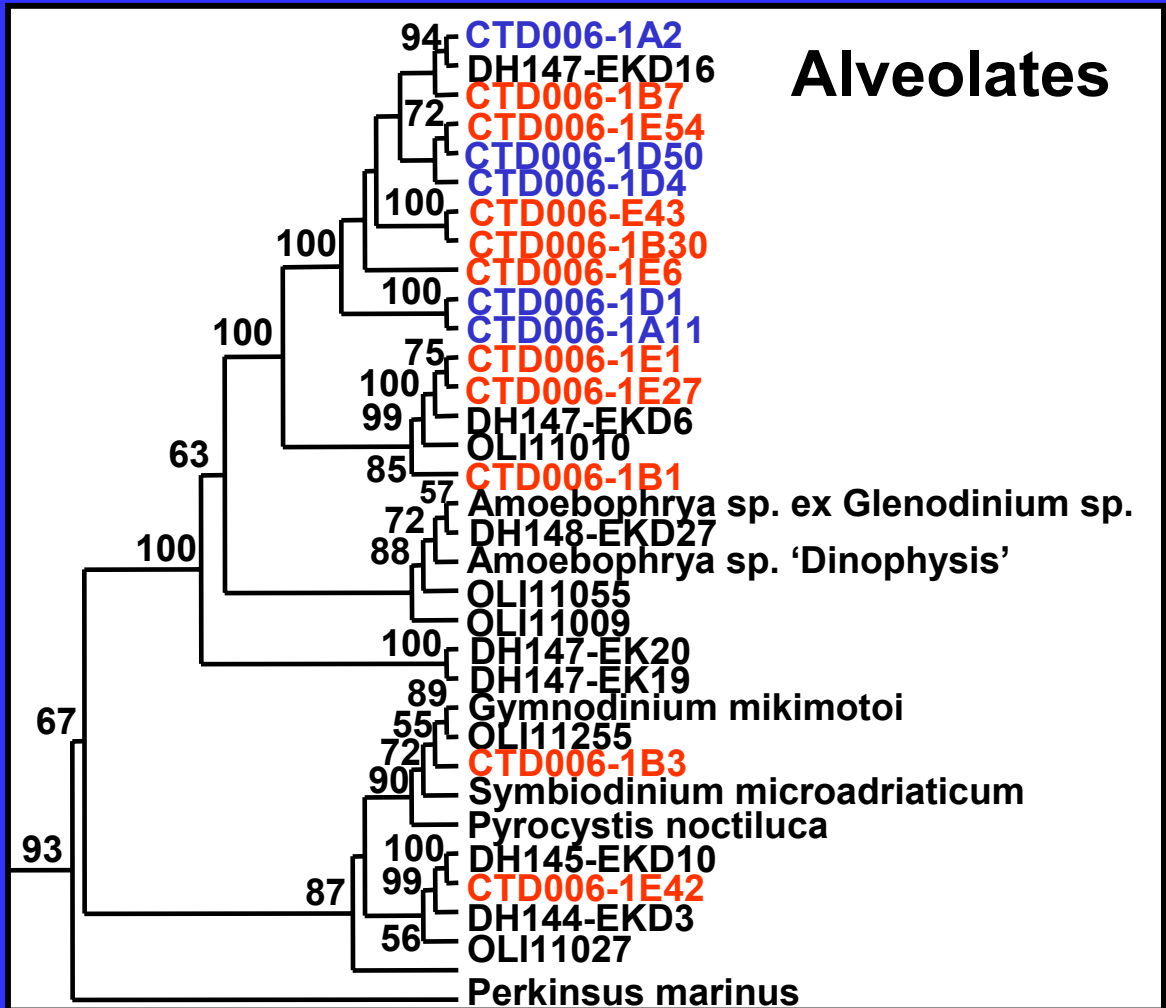
# Sargasso deep sea microorganisms





**CTD006; CTD031 = 500 m**

**CTD006; CTD031 = 3000 m**



**Acantharean-like many in both  
 500m and 3000m libraries**

**Thraustocytrid-like so far 500m only**

# From here?

**Quantification in the environment...  
importance of cellular parameters  
and rates**

**Ecological roles?**

**Interactions?**

# Acknowledgements

**Farooq Azam**

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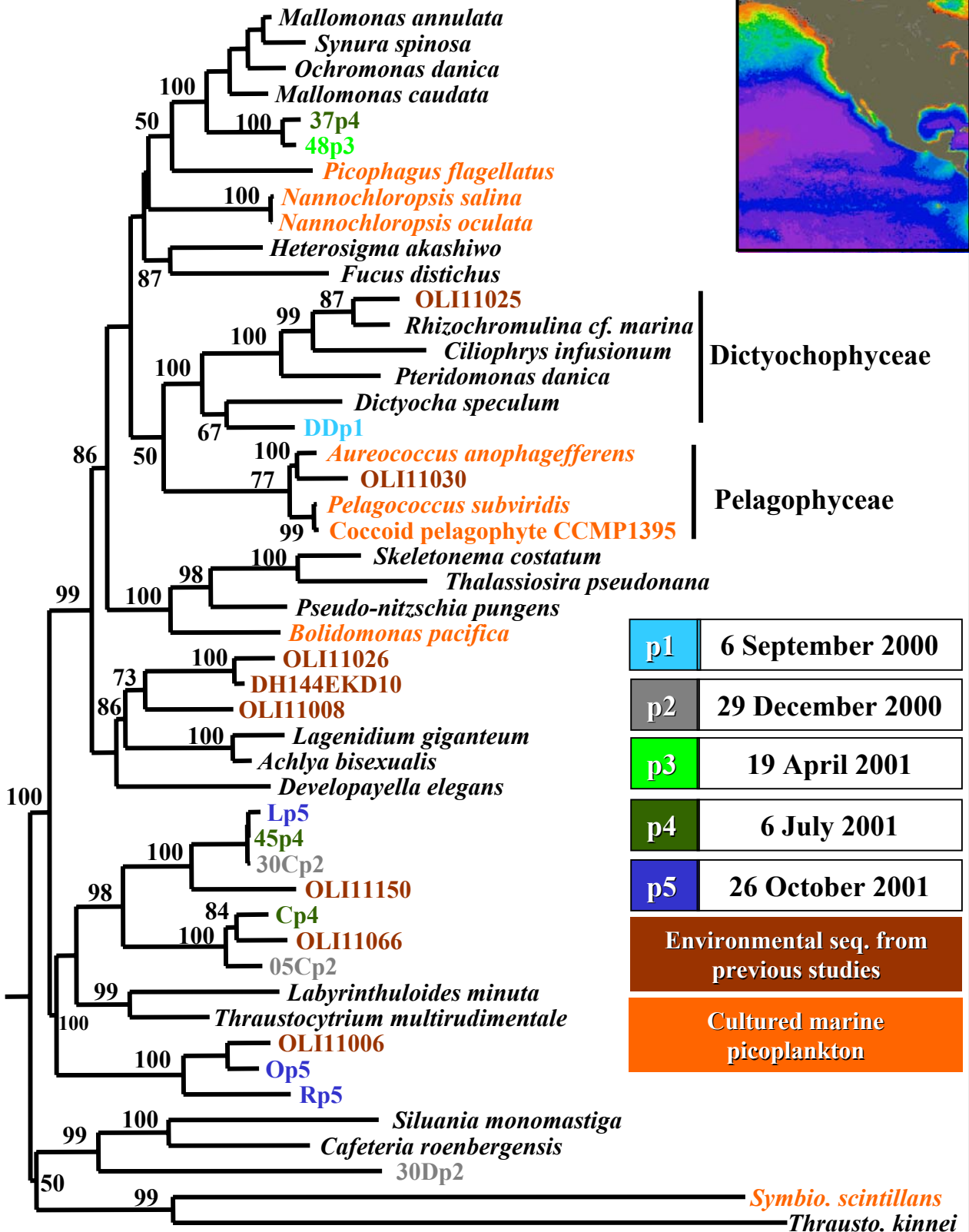
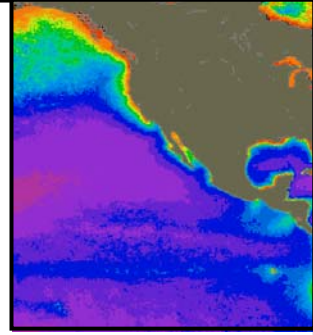


**NSF to AZW**



**UCSD Academic  
Senate to FA**

# Stramenopiles



# Bacteria and archaea