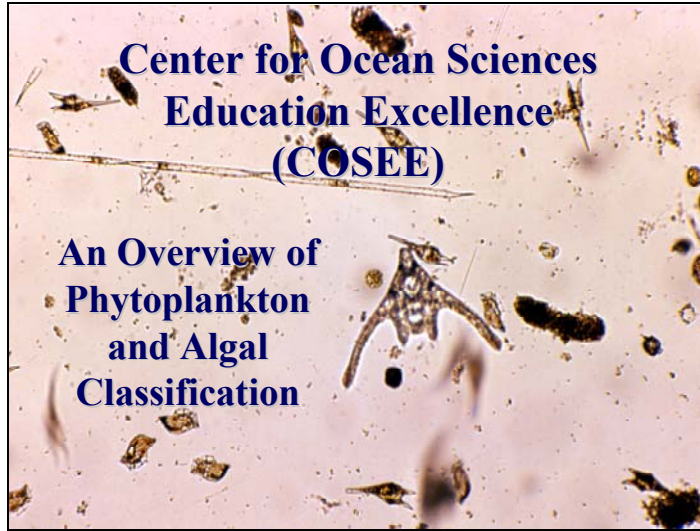


Slide 1






**Center for Ocean Sciences
Education Excellence
(COSEE)**

**An Overview of
Phytoplankton
and Algal
Classification**

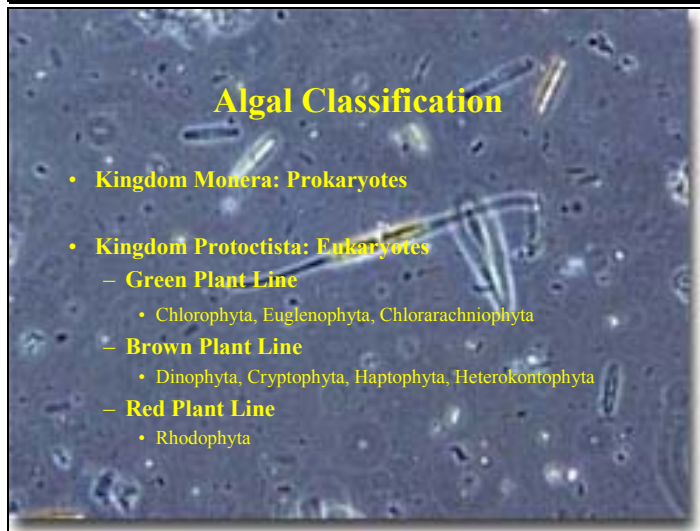
Slide 2

Phytoplankton: Vital Statistics

<http://seawifs.gsfc.nasa.gov/SEAWIFS/TEACHERS/BIOLOGY>

- Diameter: < 1 um to over 100 um
<http://www.pcmics.org/history/10mo.html>
 - If you stack 1000 one micron phytoplankton end to end, the length of the stack would equal the width of a penny! (18,000 would fit across the face)
- Concentration: 1000's to 1,000,000 per milliliter

 - If you fill a soda can with seawater from a thick, oceanic phytoplankton bloom, the can may contain as many as 75 to 100 million cells!<http://www.yana-chris.com/cats/images/surge.gif>
- Global Biomass: less than 1% of the total plant biomass on earth

 - BUT are responsible for nearly half of the net photosynthesis (and oxygen production) of the biosphere!<http://santacruz.about.com/library/graphics/TREES.JPG>

Slide 3




Algal Classification

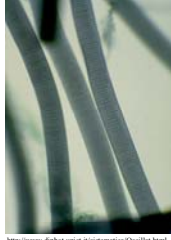
- **Kingdom Monera: Prokaryotes**
- **Kingdom Protocista: Eukaryotes**
 - **Green Plant Line**
 - Chlorophyta, Euglenophyta, Chlorarachniophyta
 - **Brown Plant Line**
 - Dinophyta, Cryptophyta, Haptophyta, Heterokontophyta
 - **Red Plant Line**
 - Rhodophyta

Slide 4

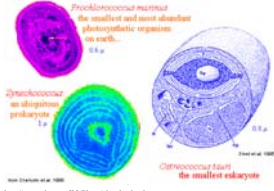
- **Kingdom Monera: Prokaryotes**
 - **Cyanophyta or Cyanobacteria**
blue-green algae
 - **Prochlorophyta**
prochlorophytes



<http://www.biol.tokuba.ac.jp/~inozumi/occy/spiralin.gif>



<http://www.digbot.umc.it/scemtica/Oscillator.html>



Prochlorococcus marinus
the smallest and most abundant photosynthetic organisms on earth.


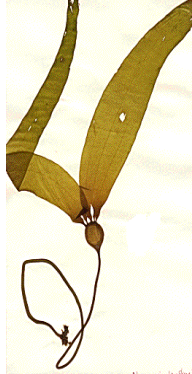
Synechococcus
an ubiquitous prokaryote.

Chlorococcoid form
the smallest eukaryote.

<http://www.ab-conoff.it/Phyto/psocplan.html>

Slide 5

- **Kingdom Protocista: Eukaryotes**
 - **Green Plant Line**
 - **Brown Plant Line**
 - **Red Plant Line**




Macroscopic forms of algal groups



<http://www.sosoma.edu/biology/algae/Red.html>
(all three species photographs)

Slide 6

- **Kingdom Protocista: Eukaryotes**
 - **Green Plant Line**
 - **Brown Plant Line**
 - **Red Plant Line**



<http://www.warburg.edu/biodept/main1/demid.html>




Microscopic forms of algal groups


http://www.digbot.umc.it/scemtica/Polys_4.html

Slide 7


- **Kingdom Protocista: Eukaryotes**
 - **Green Plant Line**
 - Chlorophyta, Euglenophyta, Chlorarachniophyta




http://seaweed.ucj.ie/foto/SSO_BHMulva_lactuca.htm



<http://www.durr.demon.co.uk/euglena.html>




<http://staff-www.uni-marburg.de/~cellbio/other.htm>



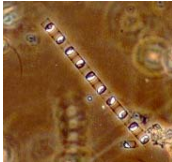
<http://www.scobotation.it/sectabularia.htm>

Slide 8


- **Kingdom Protocista: Eukaryotes**
 - **Brown Plant Line**
 - Dinophyta, Cryptophyta, Haptophyta, Heterokontophyta




http://www.marbot.gu.se/~/others/Tetradiax_ambrosia.htm




<http://img423.hibone.com/p15.jpg>



<http://halomon.gu.se/ari/colr/flora/arranged.htm>
(Photo by Jan Riesen, Acad. Nat. Sci., Philadelphia)




<http://www-ocean.tamu.edu/Quardeck/QDS2/pariente.html>
(Photo by Yia Pariente)



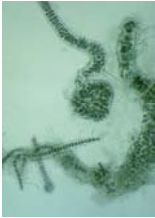


(c) Phillip Coila
www.oceanlight.com
<http://www.oceanlight.com/assets/images/0628.jpg>

Slide 9


- **Kingdom Protocista: Eukaryotes**
 - **Red Plant Line**
 - Rhodophyta



<http://www.sosoma.edu/biology/digae/Red.html>
(all four photographs)



http://www.digbot.unict.it/sistematica/Polys1_s.html




http://www.digbot.unict.it/sistematica/Polys1_s.html

Slide 10

So ... what do phytoplankton do?

- Photosynthesis
 - Cycling of elements
 - Source of dissolved and atmospheric oxygen
- Base of food webs
 - provide nutrition to zooplankton as primary consumers, and to other food web levels



<http://www.cjgungames.com/foodchain>

Slide 11

PLANKTON

We're an indolent lot ...

Shiftless microscopic drifters.

Here in the oceans a million trillion trillion of us just float and aimlessly worship the sun.

We have no brains at all.

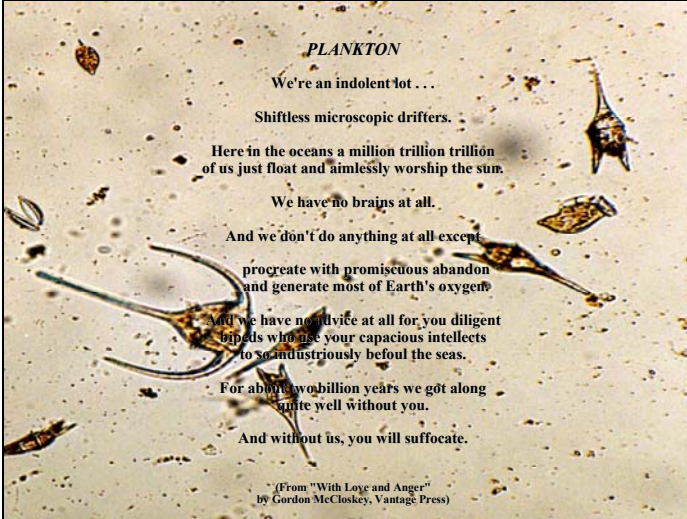
And we don't do anything at all except procreate with promiscuous abandon and generate most of Earth's oxygen.

And we have no advice at all for you diligent bipeds who use your capacious intellects to so industriously befoul the seas.

For about two billion years we got along quite well without you.

And without us, you will suffocate.

(From "With Love and Anger" by Gordon McCloskey, Vantage Press)

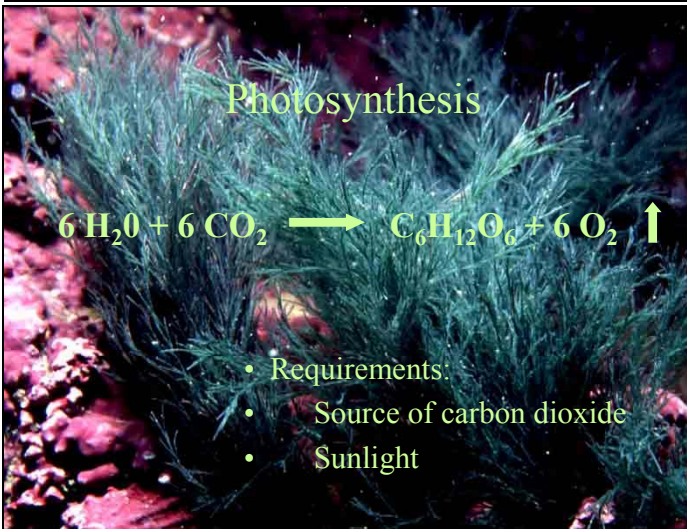


Slide 12

Photosynthesis

$$6 \text{H}_2\text{O} + 6 \text{CO}_2 \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2 \uparrow$$

- Requirements:
- Source of carbon dioxide
- Sunlight



Slide 13

- An overview of photosynthesis ...

$$6 \text{H}_2\text{O}$$

$$+$$

$$6 \text{CO}_2$$

$$\downarrow$$

$$\text{C}_6\text{H}_{12}\text{O}_6$$

$$+$$

$$6 \text{O}_2$$

http://gened.emc.maricopa.edu/bio/bio111/BIO108K/photosynthesis.gif

Slide 14

- An overview of the carbon cycle ...

http://www.geog.ox.ac.uk/phylogeo/content/9r.html

Slide 15

... and estimated major stores of carbon on the Earth (billions of metric tons)

| | |
|----------------------------|--------------------------------------|
| Atmosphere | 578 (as of 1700) 766 (as of 1999) |
| Soil organic matter | 1,500 to 1,600 |
| Ocean | 38,000 to 40,000 |
| Marine sediments and rocks | 66,000,000 to 100,000,000 |
| Terrestrial plants | 540 to 610 |
| Fossil fuel deposits | 4,000 |

http://www2.oup.com/ac/uk-06120/images/waves.jpg