

Lecture 10/28/2014

Review

Transduction (horizontal gene transfer) is associated with both the **lytic** and **lysogenic** cycle.

Ch 29- Protists

2 billion year span between prokaryotes and eukaryotes → first eukaryote found 1.5 billion years ago and prokaryotes are 2 billion years older!

1st Eukaryote → resembled **green algae** and had clear nuclear membranes enclosing the DNA

A very diverse group...

- Called the "catch all" group because if something has the characteristics of a plant but it's not a plant and an animal but it's not an animal then they throw it in with the protists
- Bizarre, funky bunch → phylogenetically have multiple independent lineages not clearly related to each other
- No characteristic **UNIQUE** to all protists
- Protist evolution contains critical evolutionary transitions
 1. Prokaryotic → Eukaryotic
 2. Asexual (binary fission) → Sexual (allows for more diversification)
 3. Unicellular → Multicellular (allows for different roles among cells)

Theory of Endosymbiosis

- Prokaryotes → Eukaryotes- starts with membrane bound nucleus
- Based upon organisms living together in close association (symbiosis)
This likely started with prokaryotes having other prokaryotes living in their cells → mutualism (+, +) then this relationship evolved into eukaryotic organisms

Who are the Protists?

- Amoeba, ciliates (paramecium), diatoms, euglena, plasmodium (malaria= #1 killer in the world), trypanosomes (African sleeping sickness and chagas), slime molds, stentors, kelp (seaweed)
- Very important to food webs- make most of the oxygen in the world.

Aquatic Autotrophic Protists

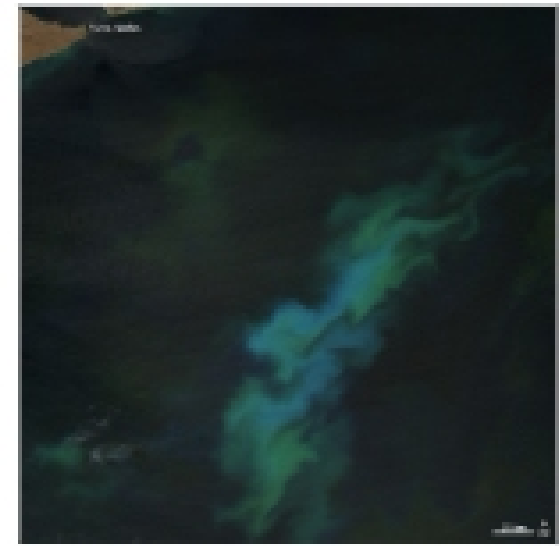
- Phytoplankton → phyto= plants and plankton= floating BUT they're not plants!
- Found in all freshwater/marine systems → dominant organism in these systems
- Rely on photosynthesis... $\text{CO}_2 + \text{H}_2\text{O} + \text{Light} \rightarrow \text{O}_2$ (most important!) + Organic Carbon (food)
- Produce 80-85% of Earth's O_2

Bloom- Lots of phytoplankton

River off coast of Argentina → mostly diatom bloom → nitrogen and phosphorus from river mouth make green bloom

Dominated by green algae/ diatoms (also include cyanobacteria but they aren't protists)

Figure 1: Gyory, J., Mariano, A.J., and Ryan, E.H. The Malvinas Current. Ocean Surface Currents, National Oceanographic Partnership Program. Accessed October 30, 2012. November 2, 2014. <http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=79567>



Diatoms

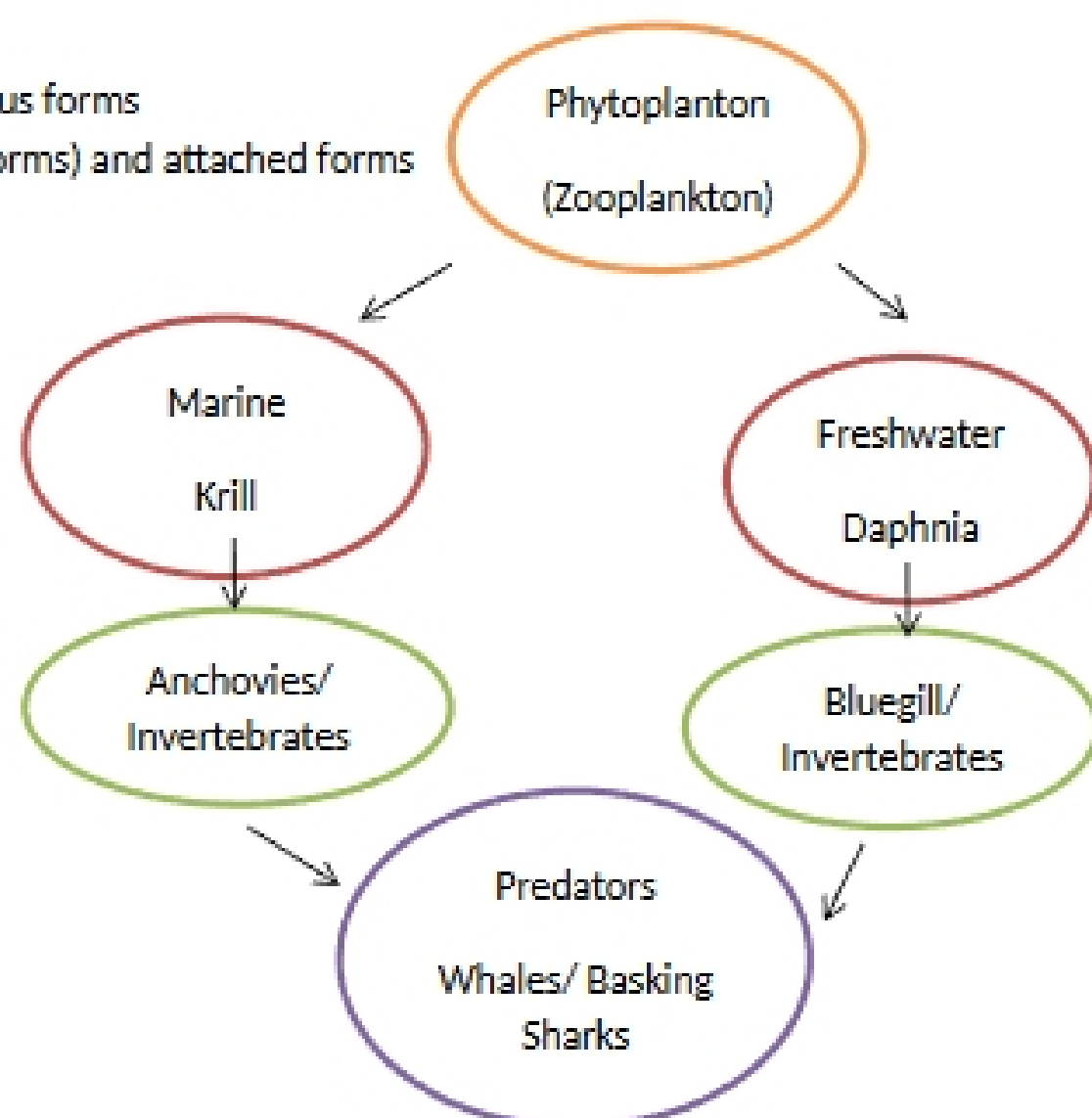
- Largest/ most abundant group of phytoplankton
- Include floating forms and attached forms (attached forms are not phytoplankton!)
- Floating forms are not actively moving → drifting passively with currents
- Can be single organism or colonial (stacks of interacting cells)
- Structure → Living protist sandwiched between 2 shells (frustules) → diatom secretes these shells made of a silica/calcium matrix → think of it like a petri dish with an organism living inside
- Diatoms are important to everyday life
 1. Diatomaceous Earth (mined)- used for toothpaste, kitty litter, pool filters
 2. Used in paleontology- based on the species of diatoms present in sediments/geological strata
 3. Indicate specific environment conditions → due to differing species- specific tolerances related to salinity, acidity, temperature

They are truly found everywhere

Green Algae- chlorophyta

- Primarily unicellular, colonial forms, filamentous forms
- Strictly autotrophic- phytoplankton (floating forms) and attached forms
- You can find these everywhere too
- Krill and Daphnia ingest diatoms/green algae

Phytoplankton: CRITICAL TO FOOD WEBS



Dinoflagellates- can be phytoplankton

- Symbiotes with coral- Zooxanthellae are the dinoflagellates that live in coral
- Defined based upon having 2 flagellae → locomotion (movement) and foraging
- Primarily mixotrophs- use both autotrophy and heterotrophy (promoted by flagellum)

Extreme examples:

- **Pfeisteria**- massive fish death- highly toxic dinoflagellate. Blooms kill vertebrates and invertebrates
- **Red tide**- typically toxic
- **Bioluminescent**