

Protista: Algae and Heterotrophic Protists
Chapter 15

Kingdom *Protista*

- What do we already know about protists?

Algae

- freshwater food chains
 - chrysophytes, diatoms, green algae, dinoflagellates
- marine food chains
 - haptophytes, dinoflagellates, diatoms
- plankton
- grown to support shrimp, shellfish, etc.
- seaweed farms for human use
- “blooms” result from ecosystem disruption
- carbon cycle
- many photosynthetic
- some also take up dissolved organic compounds

Plasmodial Slime Molds
Phylum Myxomycota

- heterotrophic
- terrestrial
- not clearly related to any group

Cellular Slime Molds
Phylum Dictyosteliomycota

- heterotrophic
- terrestrial
- most likely related to amoeba
- commonly occur in litter-rich soils

Dinoflagellates
Phylum Dinophyta

- unicellular
- about half photosynthetic
- biflagellate
- may have cellulose plates
- mostly marine, many freshwater
 - some produce toxic compounds or harmful red tides

- *Pfiesteria piscicida*
- some symbiotic with reef-forming corals
- some bioluminesce

Euglenoids
Phylum Euglenophyta

- unicellular
- 1/3 genera contain chloroplasts
- flagellates
- no cell wall
 - but have helically arranged proteinaceous strips beneath plasma membrane
- mostly freshwater, some marine

Cryptomonads
Phylum Cryptophyta

- unicellular
- some are photosynthetic
- flagellates
- no cell wall
- marine and freshwater

Haptophytes
Phylum Haptophyta

- unicellular or colonial
- most photosynthetic
- some flagellated, others nonmotile
- cell wall
- mostly marine
- *Prymnesium parvum*

Summary so far...

- focus on groups with photosynthetic members
- distinguish among groups in broad sense
- ecological importance

Heterokonts

- all groups to come except red and green algae
- “different flagella”
- closely related

Oomycetes
Phylum Oomycota

- unicellular or filamentous
- heterotrophic
- heterokonts
- cell wall
- marine, freshwater and terrestrial
 - some important plant pathogens
 - *Phytophthora*
 - *Pythium*

Diatoms
Phylum Bacillariophyta

- unicellular or colonial
- most photosynthetic
- some have flagella
- cell wall of silica
- marine and freshwater

Chrysophytes
Phylum Chrysophyta

- unicellular or colonial
- most photosynthetic
- none or two flagella
- some have cell walls
- mostly freshwater, some marine

Brown Algae
Phylum Phaeophyta

- simple multicellular
- photosynthetic
- cell wall with cellulose
- almost all marine
- alternation of generations

Red Algae
Phylum Rhodophyta

- multicellular
- photosynthetic
- no flagella
- cell wall

- mostly tropical, marine; some freshwater
- some have alternation of generations

Green Algae Phylum Chlorophyta

- unicellular, colonial, filaments and other forms
- photosynthetic
- none or two flagella
- cell wall
- mostly aquatic
- most closely related to plants
- three major groups distinguished by
 - cell division
 - reproductive cell structure
 - other features
- Chlorophyceae
 - multiple forms
 - some flagellate
 - mostly freshwater
 - unique form of cytokinesis
 - laboratory model systems
 - *Chlamydomonas*
 - *Volvox*
- Ulvophyceae
 - multiple forms
 - 2, 4 or many flagella
 - alternation of generations in marine species
 - mostly marine
 - *Ulva*
 - *Cladophora*
- Charophyceae
 - multiple forms
 - some flagellate
 - mostly freshwater
 - most similar to plants: *Coleochaete* and *Chara*

Summary

- characteristics of all protists
- distinguish among phyla
- ecological importance of each phylum
- relationships with plants