



Aquatic organisms overview

- What the heck is a species anyway?
- Classifying organisms
- Microbes and plants



Species concepts

- **Biological species concept**
- But...what about **morphological** and **ecological species concepts**?
- Reality for non-taxonomists: listen to the experts
 - Phylogenetics, molecular methods...see text, rRNA



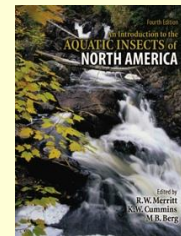
Fig. 8.2
Eichhornia azurea
Floating vs. submerged

Some comments

- Past expertise for last generation of ecologists
- Retiring; want a job?



J. Bruce Wallace



Rich Merritt

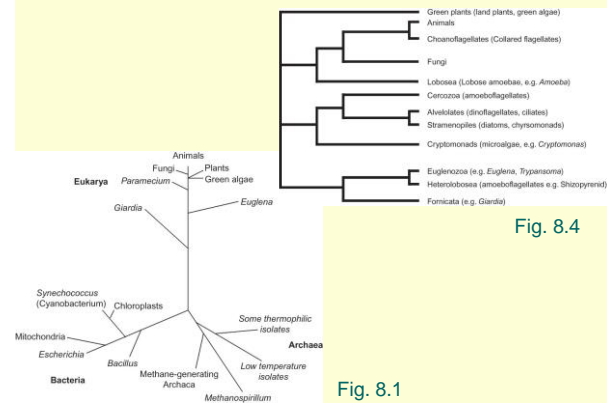
Classification

- Based on what?
 - Traditional / taxonomy / phylogeny
 - **Functional role**
 - Make your own food?
 - Food source?
 - *Functional feeding group*?
 - Who eats who?
 - Where do you live?
 - How do you get along with others?



Perlodid stonefly =
Predator-engulfer

Two "freshwater trees"



Cyanobacteria

- Photosynthetic
- Fix nitrogen with **heterocysts**
- Float by gas vesicles
- Unique light-harvesting pigments (phycobilins); which wavelengths?
- Produce objectionable odors, tastes, and toxins



Microcystis

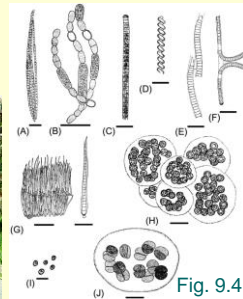


Fig. 9.4

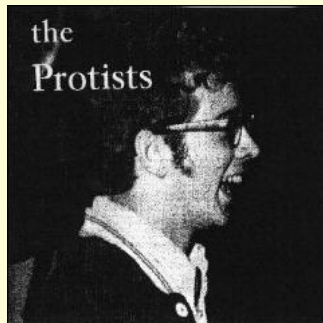
Cyanobacterial toxins

- Produce hepatotoxins and neurotoxins
- Toxins can be bioconcentrated by some organisms (e.g., clams), and influence many different types of animals (e.g., livestock drinking)
- Why toxins?
 - Evolved as protection against zooplankton grazing



Protoctista

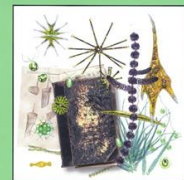
- Eukaryotic algae
- Protozoa



Eukaryotic algae (1)

- Photosynthetic; contain chlorophyll *a*
 - Rhodophyceae
 - Chrysophyceae
 - Bacillariophyceae
 - Dinophyceae
 - Euglenophyceae
 - Chlorophyceae
 - Charophyceae

Freshwater Algae of North America Ecology and Classification



Edited by
John D. Wehr and Robert G. Sheath

Eukaryotic algae (2)

- **Rhodophyceae: red algae**, relatively rare, lotic, also contain phycobilins
- **Chrysophyceae: flagellated, planktonic**, some ingest particles, oligotrophic lakes



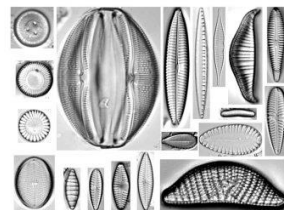
Batrachospermum



Dinobryon

Eukaryotic algae (3)

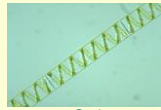
- **Bacillariophyceae: diatoms**, have *silicon frustule* that is useful in paleolimnology and forensics, abundant in many types of freshwaters
- **Dinophyceae: dinoflagellates, flagellates**, some toxic and cause fish kills, many ingest particles, *Pfiesteria piscicida* (estuaries), mostly lakes



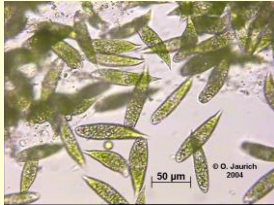
Pfiesteria piscicida

Eukaryotic algae (4)

- **Euglenophyceae**: all unicellular, motile, can ingest particles, eutrophic
- **Chlorophyceae**: **green algae**, most diverse freshwater algae, all surface water habitats
- **Charophyceae**: **stoneworts**, *Chara*, can be encrusted with calcium carbonate, thought to be closest relatives to green land plants



Spirogyra



Euglena



Chara

Protozoa

- Important microbivores
- Some human parasites
- Mastigophora- flagellates
 - Phytomastigophora- green
 - Zoomastigophora- colorless
- Sarcodina- amoeboid protozoa
- Ciliophora- ciliates

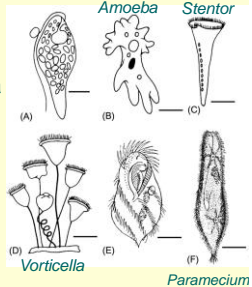
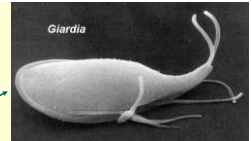


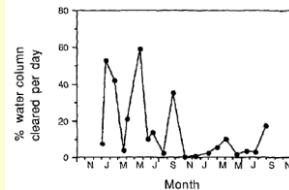
Fig. 9.11

Paramecium

Paramecium

Blackwater river protozoa

- Flagellates and ciliates very abundant in the Ogeechee River, GA
- Average of 15.6% of total bacteria in water column removed by these protozoa
 - Flagellates always >2X as important as ciliates



Carlough and Meyer (1991)



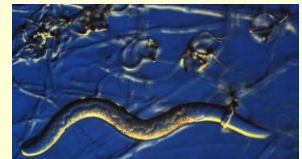
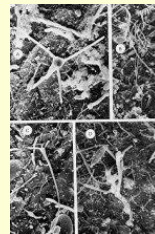
Judy Meyer

Fungi

- Aquatic Fungi
 - saprophytic (e.g., aquatic hyphomycetes)
 - some predatory
- Aquatic Lichens
 - symbiosis between fungi and algae
 - can be important in some wetlands



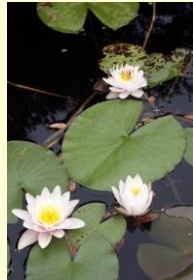
Vlad Gulis



Arthrobotrys

Plantae

- Nonvascular plants
- Vascular plants
- Large algae and plants called **macrophytes**, often classified by growth habit



Nonvascular plants

- **Bryophytes**: **mosses** and **liverworts**
- *Sphagnum* globally important in carbon deposition in peat bogs; locally important
- Some aquatic mosses can be found very deep in oligotrophic lakes
- Some streams can be dominated by bryophytes



Janice Glime

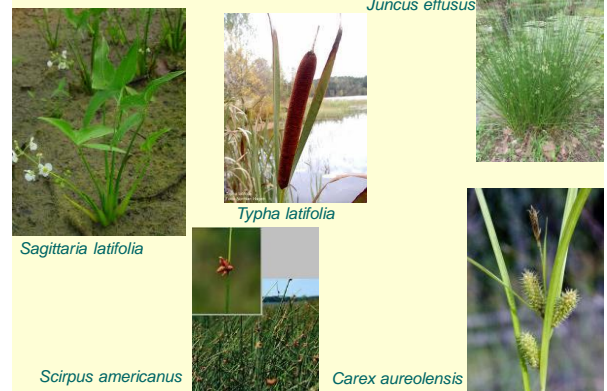


Vascular plants

- Dominant producers in many wetlands, shallow lakes and ponds
- Recall wetland classification system...
- A wide variety of forms



Morphology—Emergents



Morphology—Floating



Morphology—Submersed



Podostemum ceratophyllum



Podostemum and insects



Filterer



Scraper

