

## KINGDOM PROTISTA

### I. General

- more complex than monerans (bacteria)
- eukaryotic
- grouped according to overall characteristics
  - o animal-like, plant-like, and fungus-like

### II. PROTOZOANS (Animal-like protists)

- unicellular heterotrophs
- grouped by the way they move or don't move
  - o pseudopodia, cilia, or flagella
- Groups
  - A. Phylum Rhizopoda (amoebas)
    - move by pseudopodia ("false feet")
      - extensions of the cytoplasm
    - freshwater & marine environments
    - Foraminifera = amoebas with shells of calcium carbonate (CaCO<sub>3</sub>)
    - Radiolaria = amoebas with shells of silica
    - Reproduction:
      - Asexual
      - If conditions are not good- form a cyst
        - o Amoebic dysentery (severe watery diarrhea= extreme dehydration) is caused by a cyst-forming amoeba
  - B. Phylum Zoomastigina (Flagellates)
    - move by flagella (whip-like tail)
    - mostly parasites that cause disease in animals
    - some mutualistic = live in guts of termites
      - digest cellulose in wood which helps both the protist and the termite
  - C. Phylum Ciliophora (ciliates)
    - move by synchronized (at the same time) beating of cilia (hair-like structures)
    - Paramecium Structures
      - Anal pore – waste removal
      - Cilia - movement
      - Micronucleus – sexual reproduction
      - Macronucleus – everyday functions
      - Contractile vacuole – eliminates excess water
      - Oral groove – sweep food into the gullet
      - Gullet – digestive enzymes break down food
    - reproduction
      - asexual-division
      - sexual-conjugation
  - D. Phylum Sporozoa (sporozoans)
    - parasitic, non-motile
    - reproduction – spores
    - Examples
      - *Plasmodium* – spread by the Anopheles mosquito; causes malaria
      - *Trypanosoma* – spread by the Tsetse fly; causes African sleeping sickness
      - *Giardia lamblia* – spread by contaminated drinking water; causes explosive diarrhea

### III. ALGAE: Plant-like protists

- What are algae?
  - o Photosynthetic protists (autotrophs!)
  - o Range in size: single-celled to large, multi-celled

- No roots, stems, or leaves
- Classified by pigments
- Base of food chain; major source of world's:
  - Nutrients
  - Oxygen (produces about 75% of O<sub>2</sub> for Earth)
- Phyla of algae
  - A. Euglenophyta (Euglenoids)
    - Unicellular; aquatic
    - Plant-like; have chlorophyll
    - Animal-like; move and can consume food if there's no light available
  - B. Bacillariophyta (Diatoms)
    - unicellular; aquatic
    - grouped by shape:
      - radial symmetry (no distinct left or right- like a starfish)
      - bilateral symmetry (distinct right and left halves – like a human)
    - shells
      - made of silica
      - 2 halves fit together like a box
      - very intricate decorations (swirls & grooves)
    - Reproduction
      - Asexual –
        - Each half produces a new half
        - When they reach ¼ original size, sexual reproduction takes place
      - Sexual-
        - Gametes (sex cells) are produced
        - Fuse with another to form a zygote (diploid cell)
        - Zygote grows to full-sized diatom
      - Pigments-
        - Chlorophyll plus carotenoids – makes them golden/yellow colored
      - Some ocean sediments contain huge quantities of diatom shells – used for polishes and added to highway paint
  - C. Dinoflagellates (spinning algae) = Phylum Pyrrophyta
    - unicellular; aquatic
    - cell walls = thick cellulose plates
    - resemble helmets/suits of armor
    - move by two flagella that spin in grooves
    - important example! = red tide
      - huge quantities of algae produce toxin that kills fish and contaminates shellfish – can make people who eat them very sick
  - D. Phylum Rhodophyta (Red Algae)
    - multicellular; marine
    - adaptations:
      - attach to rocks by holdfasts (look like roots, but aren't)
      - red pigment (phycoerythrin) allows them to grow very deep in the oceans
  - E. Phylum Phaeophyta (Brown Algae)
    - Multicellular; marine
    - Have brown pigment (fucoxanthin)
    - Important example! = kelp
      - Body is called “Thallus” – simple plant without roots, stems or leaves
      - Can be very long (60 meters! = 180 ft.)

- Consists of holdfasts, stipe, and blade; also air bladders to hold large body up toward light
    - Form underwater forests
  - Example = Sargasso
    - Forms extensive masses that cover the Sargasso Sea in the Atlantic
- F. Phylum Chlorophyta (green algae)
  - Multicellular
  - Most diverse phylum
  - Habitats include:
    - Freshwater
    - Soil
    - Snow
    - Sloth fur!
  - Some form colonies (groups of cells that live together in close association)
    - Example: *Volvox*
- F. Reproduction of Algae
  - Asexual = fragmentation
    - Breaks into pieces and each piece grows into a full algae
  - Alternating Generations
    - Haploid generation = gametophyte
      - Makes gametes
    - Diploid generation = sporophyte
      - Makes the genetically unique diploid generation

#### IV. Fungus-like protists

- have characteristics of both plant-like and animal-like protists
- A. Slime Molds
  - 2 Phyla
    - Myxomycota = acellular
    - Acrasiomycota = cellular
  - At some point in their life cycle, they are amoeba-like, have flagella and produce spores
  - Live in cool, shady areas
  - Grow on damp, organic matter (like decaying leaves)
- B. Mildew and Water Molds
  - Phylum Oomycota
  - Some are plant parasites; others feed on dead organisms
  - Some are parasites on live fish & fish eggs
  - Generally live in water and have cell walls made of cellulose
  - Responsible for economically disastrous diseases in plants
    - Irish Potato Famine was caused by a member of this group... killed 1.5 million people in the 1840's!!!