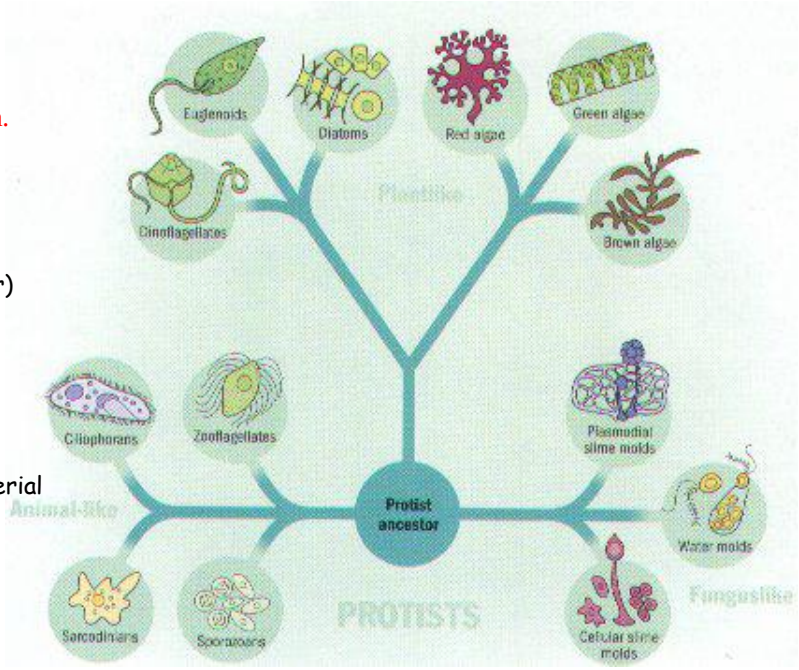
The catch-all kingdom

Kingdom Protist- How they are alike:

They are all eukaryotes which do not fit in any other kingdom.

A. Characteristics

1. no cell wall — like animals
2. have a nucleus — contains hereditary material
3. larger than bacteria
4. live in watery environments (mouth, lettuce, pond, water)
5. most live as individuals but some live in colonies
6. evolved 1.5 billion years ago



B. Reproduction

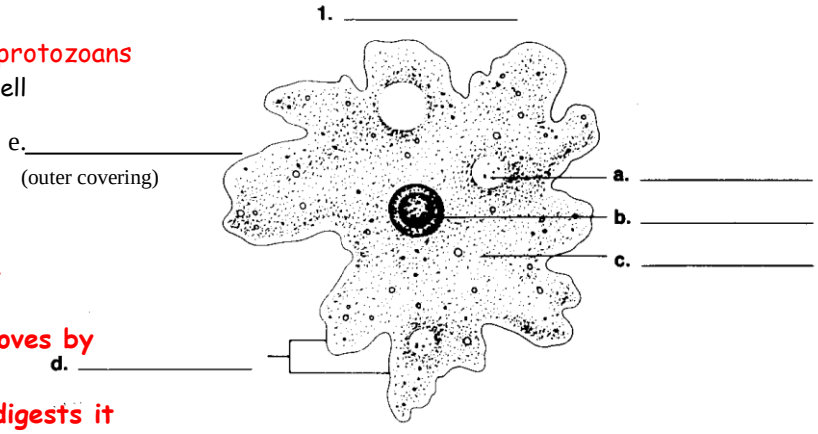
1. Binary fission: one cell splits into 2 identical cells
2. Conjugation: 2 protists join & exchange hereditary material
3. Spores: reproductive cells that develop into protozoans

- Protists are very diverse
  - **May be unicellular or multicellular**
  - **Can be autotrophs or heterotrophs**
  - **Can be plant-like, animal-like or fungus-like**
  - **Can be microscopic or large**
  - **Can move through cilia, flagella, by changing shape, or not at all!**
  - **Found on land, in fresh water, or in the ocean.**

Three main groups of Protists:

- **Protozoa (Animal-like protists): like animals, but are unicellular**
- **Algae (Plant-like protists): like plants, but have no organs (roots, stems, leaves)**
- **Slime Molds/mildew (Fungus-like protists): like fungi, but can move around at some time in their life.**

I. Animallike Protists – Protozoa (first animal)



A. Sarcodines — Amoeba (Rhizopoda) the shapeless protozoans

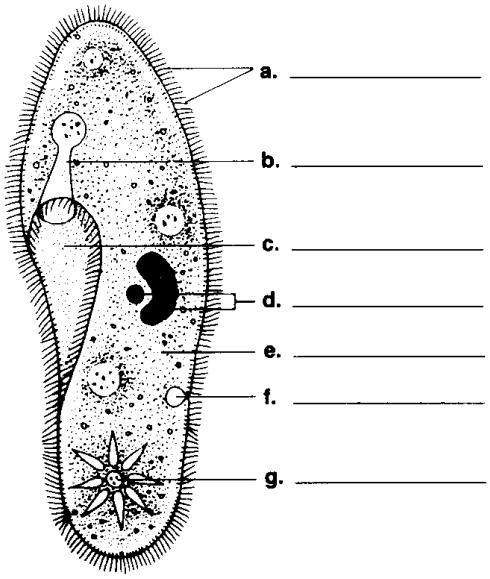
1. Move by pseudopods - "False Feet" - cytoplasm (c) & cell membrane (e) are extended & pull organism along.
   - **Constantly changing form**
2. Also uses pseudopods (d) to surround food.
   - **Have the ability to surround & digest food, and constantly pump water out of their body.**
   - Attacking Prey:
     - **→When the amoeba encounters prey, it moves by changing shape & oozing to the food**
     - **→Surrounds the food, then captures and digests it**
     - (i) food vacuole (a) — forms around engulfed food & acts as stomach.
     - (ii) uses enzymes to digest
     - (iii) waste eliminated through cell membrane
3. Many have shells (foraminiferans)
4. Contractile Vacuole — pumps out excess water.
   If it didn't amoeba would burst.
5. Reproduction — binary fission (more complex than monerans because of nucleus (d))
6. Can respond to changes in environment; move away from light.

B. Ciliates — Paramecium

1. Have thousands of small hairlike projections called cilia (a)
   3 functions: 1. helps them move
   2. sweeps food toward organism
   3. helps feel environment
2. Pellicle — hard outer covering that gives shape
3. How it eats: Cilia sweeps food into:
   1. Oral Groove (c)
   2. Gullet (funnel shaped) (b)
   3. Food Vacuole (like a stomach)
   4. Anal Pore (f) — waste & undigested stuff
4. Two Nuclei (d)
   1.Macronucleus— controls life functions
   2.Micronucleus— helps in reproduction
5. Reproduction — two ways
   (1). Binary Fission
   (2). Conjugation

Cytoplasm (e)

Contractile Vacuole (g) — pumps out excess water



2. _____

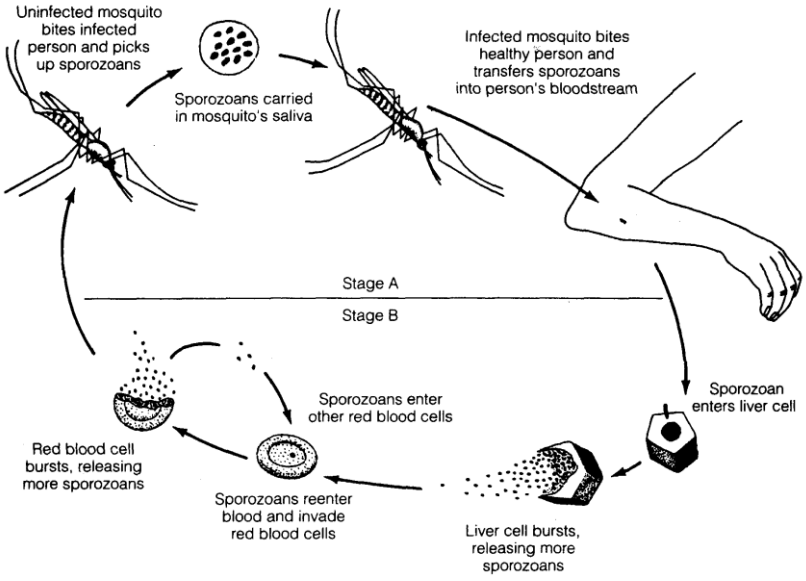
C. Zooflagellates (Zoomastigophora)

1. use flagellum to move through watery environment
2. usually have 1-8 flagella
3. many live inside bodies of animals
   GOOD = termites
   BAD (parasitic) = causes African Sleeping Sickness – carried by tse tse fly

- Protozoa and Termites
  - **Flagellated protozoans live inside the gut of termites and digest the wood, making nutrients available to the termite.**

D. Sporozoans - Plasmodium

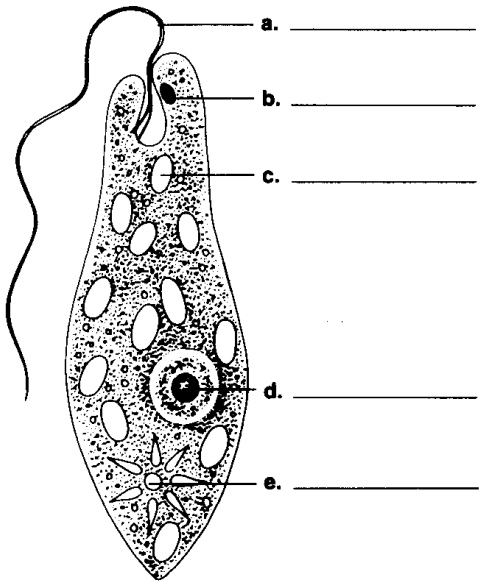
1. all are parasites
2. Have complicated life cycle
3. Form spores that develop into new sporozoans
4. Example: Plasmodium — causes Malaria (can kill – more than 2 million per year, not much in U.S.)
   a. Carried by Anopheles mosquito
   b. plasmodium enters person's bloodstream
   c. passes to liver to form spores
   d. invades & destroys red blood cells
   e. mosquito can pass disease from infected person to uninfected person
   f. medicine: quinine



II. **Plantlike Protist - Phytoflagellate**

Algae: Plant-like Protists

- **Use photosynthesis to make food & energy**
- **Six types of algae: 3 unicellular & 3 multicellular**
- **Unlike plants, algae have no roots, stems or leaves**



3. _____

A. Use a flagella (a) to propel through watery environments
B. Have chloroplasts (c) - Autotrophs – make food & oxygen (70% of all on Earth)
C. Some are food for others & some live in symbiosis
D. Reproduction — binary fission
Nucleus (d)
Contractile Vacuole (e) — pumps out excess water

→Example: Euglena
1. Both autotroph & heterotroph
2. Has an eyespot (b) — helps it move toward light

- **Lives in water, makes food & eats food**
- **Move with flagella**

→Example: Diatoms – most numerous of protists
1. enclosed in a 2 part glassy shell - pretty
2. crushed shells form diatomaceous earth – good for polishing, reflects light

- **Marine algae**
- **Diatoms make food for fish which is stored as oil. This oil gives fish their oily taste.**

→Example: Dinoflagellates – cause red tides when they reproduce rapidly & produce toxins

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Fungus-like Protists: Slime Molds, Water Molds & Downy Mildew

III. **Funguslike Protists** - heterotrophs, most have cell wall, some like amebas, some have flagella…
Example: Slime Molds – reproduction involves the production of a structure called a fruiting body which contains spores
- can sort of blob together to form multicellular structure

- **Like fungus, the fungus-like protista decompose organic materials.**
- **Unlike fungus, they move around during much of their life cycle.**

Slime Molds

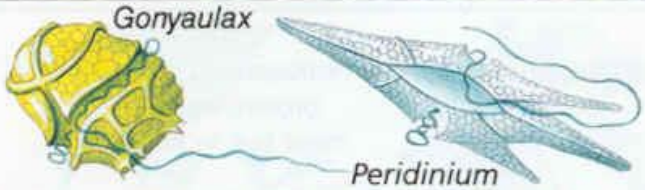
- **Live in shady, damp places and grow on rotting leaves/trees/logs.**
- **It eats while creeping over the surface of decaying matter (logs/leaves).**

Water Molds & Downy Mildew

- **Fuzzy decomposers that live in water and moist places.**
- Downy Mildew is a plant parasite

Protist Kingdom

Kingdom Protista

Phylum	Some characteristics	Examples
Euglenophyta (euglenoids)	one-celled make or take in food most have one flagellum	
Chrysophyta (golden algae)	most are one-celled make own food yellow-brown color	
Pyrrophyta (dinoflagellates)	one-celled take in food have two flagella	
Sarcodina (sarcodines)	one-celled take in food have pseudopods	
Ciliophora (ciliates)	one-celled take in food have cilia	
Mastigophora (flagellates)	one-celled take in food have two or more flagella	
Sporozoa (sporozoans)	one-celled take in food no means of movement	
Myxomycetes (slime molds)	many- or one-celled absorb food change form during life cycle