Name: _____ Unit 4: Single-Celled Organisms NOTES: 4.02

FOCUS: Animal-like Protists

ESSENTIAL QUESTIONS:

- Can you describe the various classifications of protists and explain how scientists determine which category a protist belongs in?
- Can you describe the specialized organelles used by protists that allow them to survive with just a single cell?
- What are *Paramecium* and what special adaptations do they use to carry out the basic life functions?
- What are *Amoeba* and what special adaptations do they use to carry out the basic life functions?

What are protists?

- Protists are eukaryotes that can not be classified as an animal, plant, or fungus. (The "junk drawer kingdom").
- Protists always live in moist environments.
- Most protists are single-celled; some live in colonies; and a rare few are multicellular.
- Some protists are motile (able to move) while others aren't.
- Some protists are autotrophs, some are heterotrophs, and some are both.
- Since protists are mostly primitive versions of other living organisms, scientists classify them into the following three groups:
  - animal-like protists
  - plant-like protists
  - fungus-like protists

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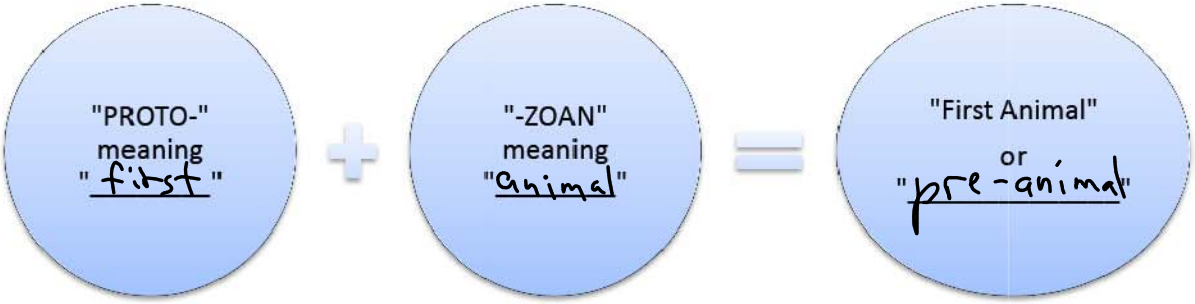
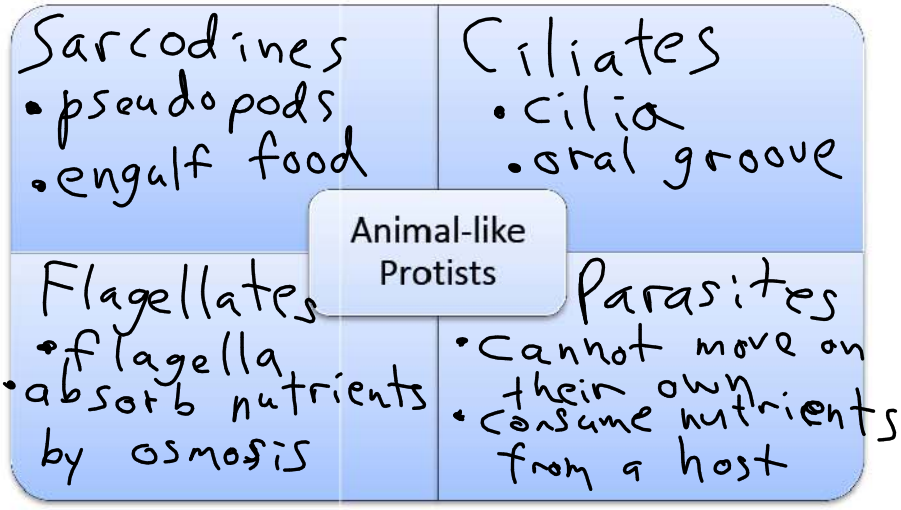
Animal-like protists

- Also known as protozoans



- What makes them like animals? different
  - They are heterotrophs
  - Able to move (motile) in order to obtain food.
- What makes them different from animals?
  - They are single-celled.
- Animal-like protists can be classified into 4 groups based on how they move and obtain food.
- **The 4 groups are:**



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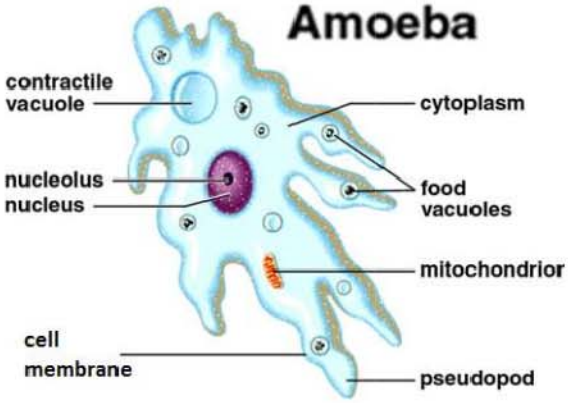
Sarcodines

- Sarcodines are protozoans with pseudopods.
- What in the world is a "pseudopod"?

- Sarcodines move and obtain food using their pseudopods.
  - Pseudopod: temporary bulging of the cell
  - Form when the cytoplasm (cell goo) flows in one direction and the rest of the organism follows
  - This process is called cytoplasmic streaming.
  - Pseudopods can also be used to trap or engulf food.
    - The pseudopod surrounds the food particle and creates a food pocket called a vacuole that becomes incorporated into the rest of the cell.



- Most Sarcodines also have a contractile vacuole to help them maintain water balance.
  - It releases water to the outside so the organism won't explode!
- Example: Amoeba

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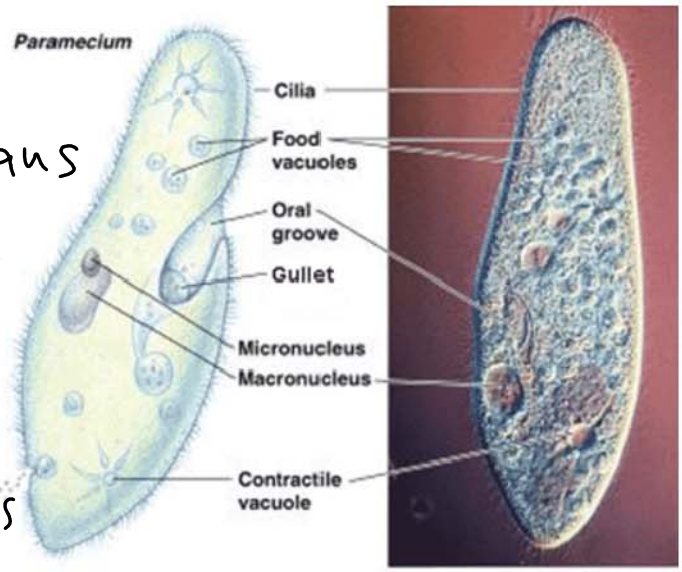

Ciliates

- Ciliates are protozoans with cilia
  - What are cilia?
    - hairlike structures
    - Move in a wavelike motion
    - Act like tiny oars to help move the organism (motility)
    - Also work to sweep food into the organism's oral groove (canal used to take in nutrients).
- Ciliates have more complex cells than Sarcodines, including:
  - Specialized contractile vacuoles
  - Two nuclei: a macronucleus (large) and a micronucleus (small)
  - Specialized digestive organelles:

oral groove → gullet → food vacuoles

- Example: paramecium

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Flagellates

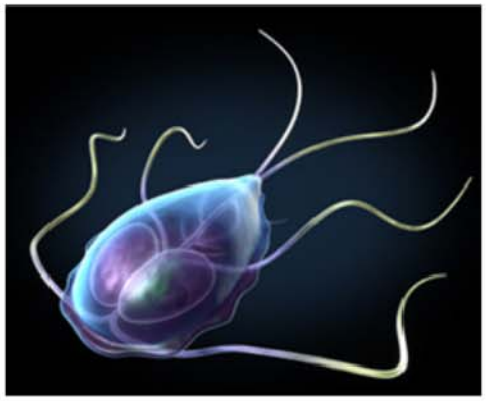
Figure 1: *Giardia lamblia*

- Flagellates are protozoans with flagella or a flagellum
  - What are flagella (flagellum is singular)?
    - tiny, whiplike structures
    - Used for movement and feeding
- Sometimes live independently in ponds or streams, but often live inside another organism (host).
  - Some are helpful to their host (mutualism). ← both benefit
    - Ex: Flagellates (*Trichonympha*) inside the digestive tract of termites help them to digest wood particles.

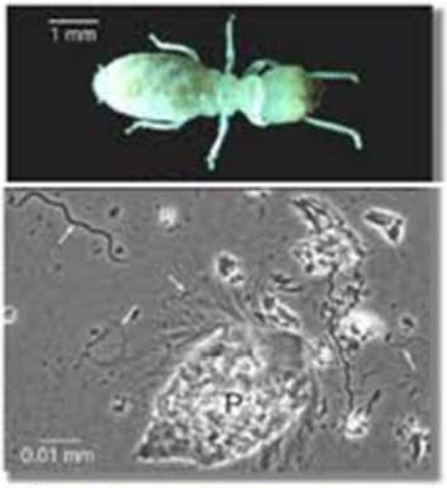

Figure 2: Termite and Trichonympha protist

  - Some are harmful to their host (parasitism).
    - Ex: giardia
    - Found in the digestive tracts of animals and the waste they leave behind in rivers and streams.
    - Humans can contract *Giardia* by drinking unpurified water from a pond or stream.

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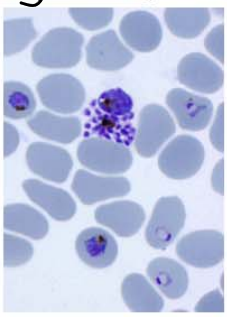
Protozoa that are Parasites

- All the protozoa in this category gain their nutrients by living inside of a host.
- Ex: Plasmodium
  - Causes a disease called malaria.
  - Live within the red blood cells of infected humans, feeding off of the cell's cytoplasm (cell goo).
  - Reproduce within the red blood cell until it lyses (bursts) and releases dozens of *Plasmodium* protozoa to go infect new new blood cells.



  - Causes fever, chills, flu-like symptoms, and anemia in cycles every 48-72 hours.
  - Passed from person to person through a vector, the mosquito.

    - **Vector**: an organism that does not cause the disease, but carries a pathogen from host to host
    - **Pathogen**: an organism that causes a disease
  - The drug to kill the parasite, quinine, is only partially effective and not always available, so the best prevention is pesticide-treated mosquito nets.
  - Over 200 million people are infected with malaria each year and over 600,000 people die.
    - 90% in Africa, but also in India and the South Pacific.