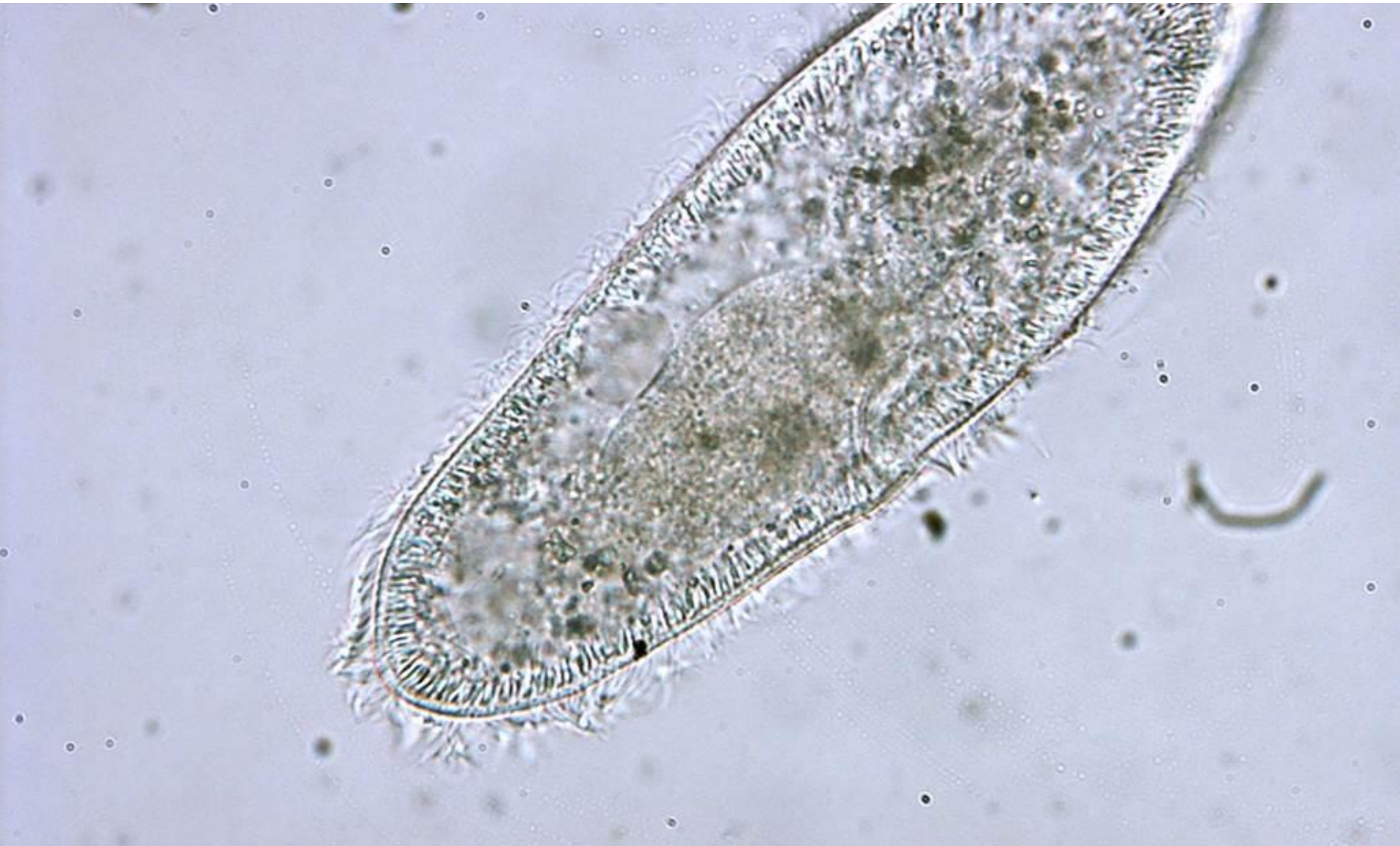
Paramecium

Week 3: heterotrophic unicellular eukaryotes



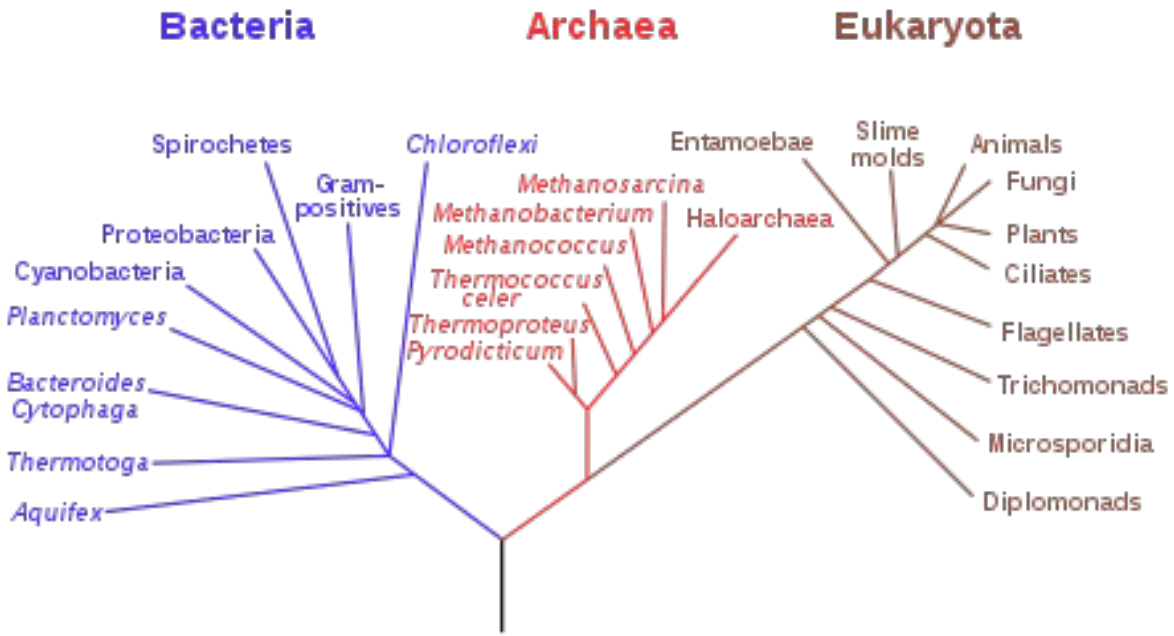
Reading:

- Read lab manual chapter 3
  - Pages 55-61, 63-80, 82-85

Weekly to-do list:

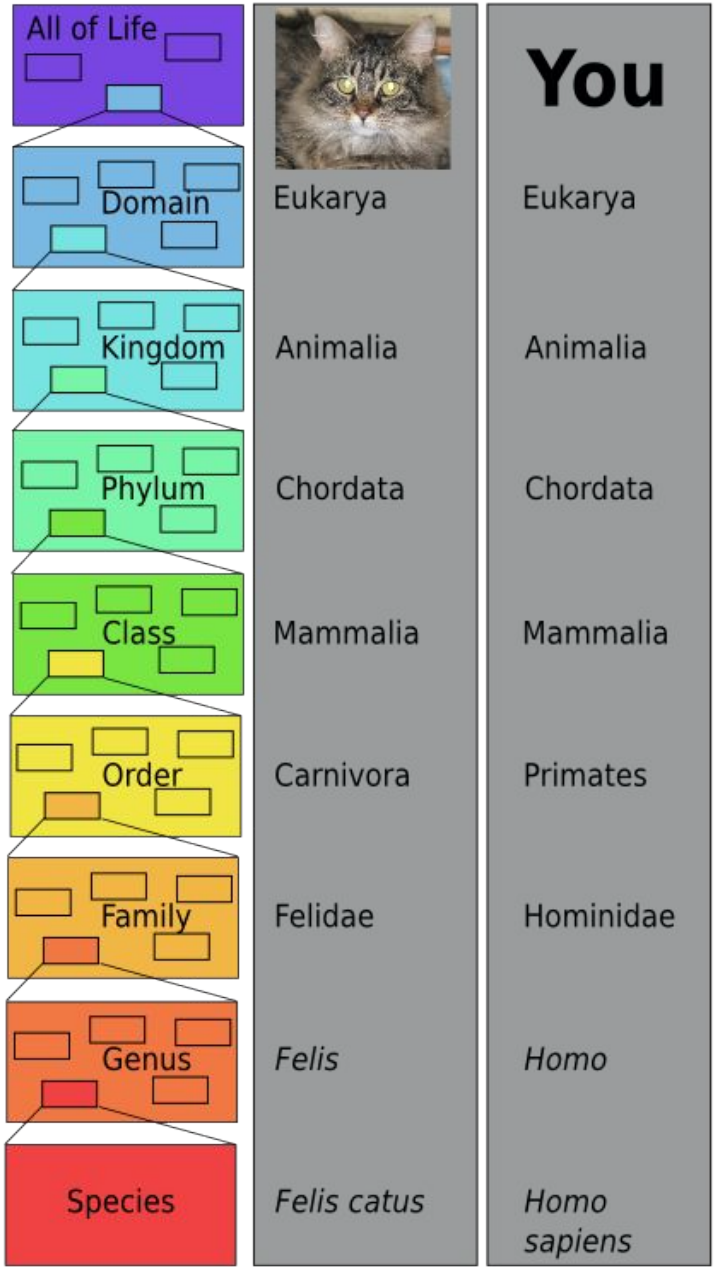
- Watch this lecture video
- Read lab manual chapter 3
  - Pages 55-61, 63-80, 82-85
- Chapter 3 quiz
- Participate in discussion forum
- Attend Zoom meeting with your TA

Before we discuss our organisms, let's go over an introduction to taxonomy and phylogenetics



Classifications to know

Domain
Kingdom
Phylum
Class
Order
Family
Genus
Species



Lineage: a single line of descent or linear chain within a tree

Biological Nomenclature

1. Genus is always capitalized, species is always lowercase
2. Underlined (writing), or italicized (typing)
3. Species name never stands alone

Example: ochre sea star

Pisaster ochraceus

P. ochraceus

<u>Pisaster ochraceus</u> (handwritten)

Which are correct?

1. Metasepia pfefferi
2. M. pfefferi
3. *M. pfefferi*
4. *Pfefferi*
5. *Metasepia pfefferi*
6. Metasepia pfefferi
7. *Metasepia Pfefferi*

Which are correct?

1. ~~Metasepia pfefferi~~
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5. *Metasepia pfefferi*
6. <u>Metasepia pfefferi</u>
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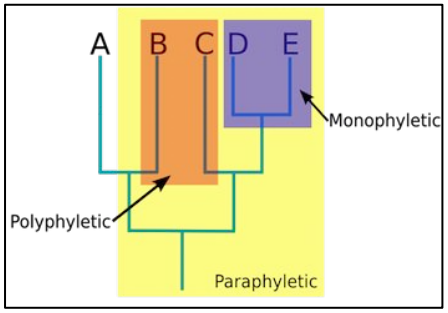
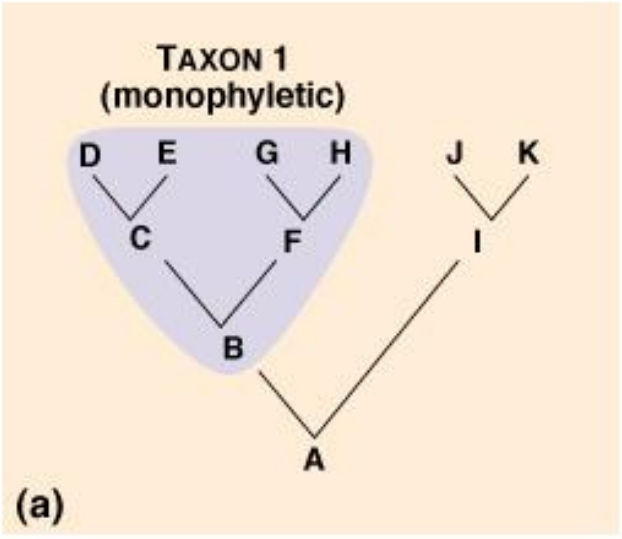
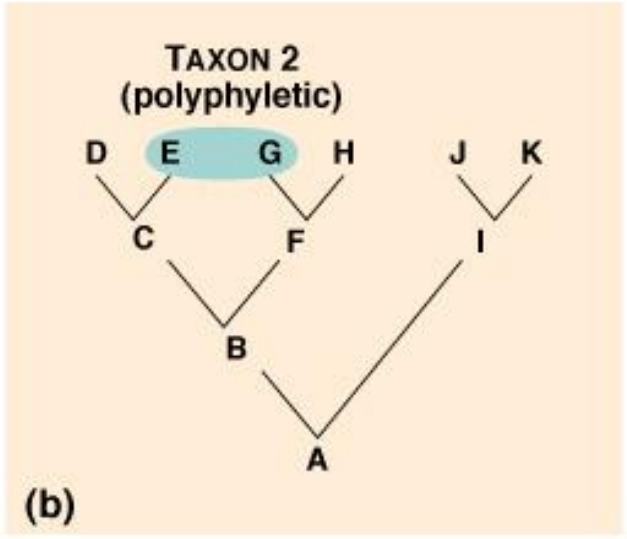
6. Metasepia pfefferi
7. ~~*Metasepia Pfefferi*~~

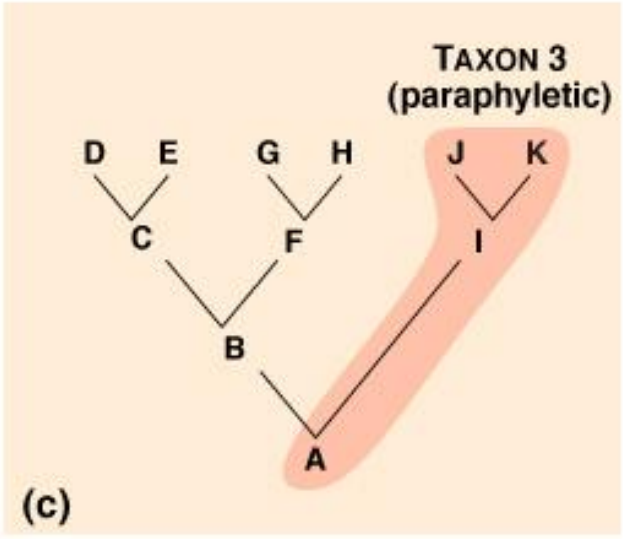
Phylogeny



- Branches are called **Clades**
- **Monophyletic**: Contains all the descendants of a common group
- **Polyphyletic:** Contains descendants that have been grouped together but do not share an immediate common ancestor
- **Paraphyletic**: Some descendants of the group's common ancestor excluded



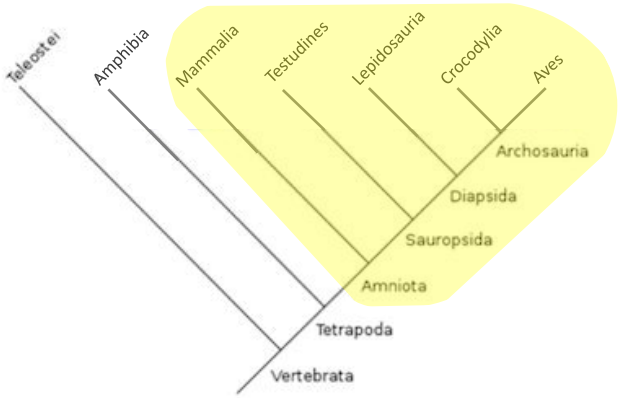




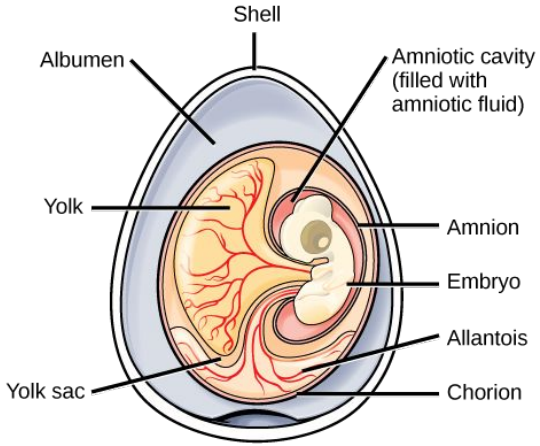
Phylogeny

Examples

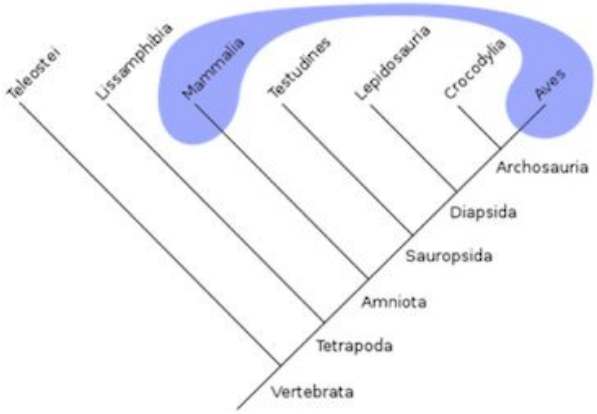
Monophyletic



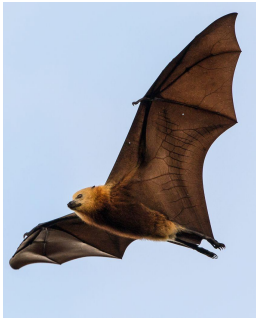
Amniotes



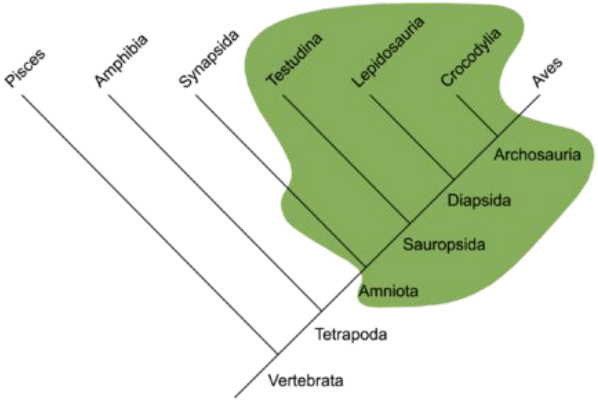
Polyphyletic



Bats (Mammalia) and birds (Aves)



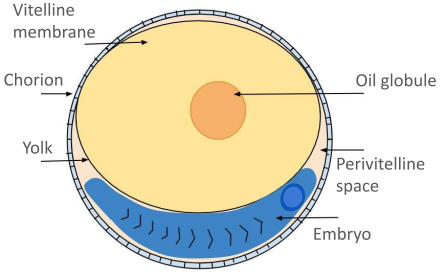
Paraphyletic

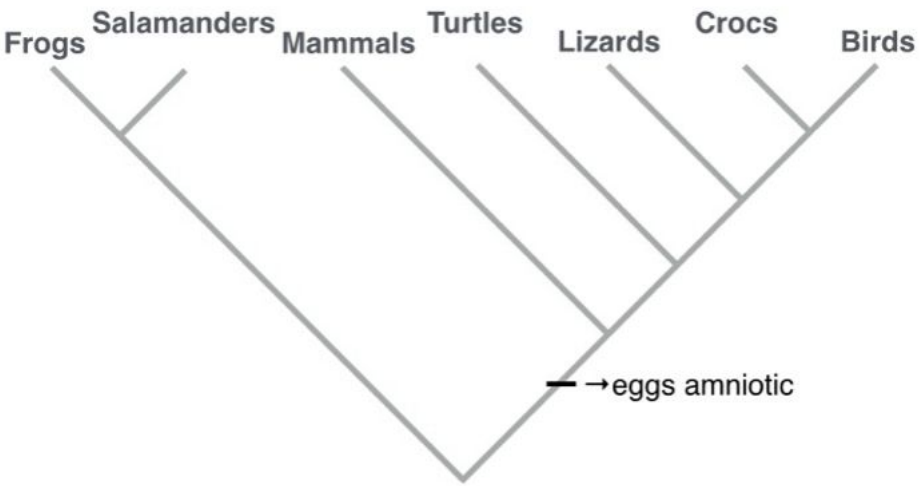


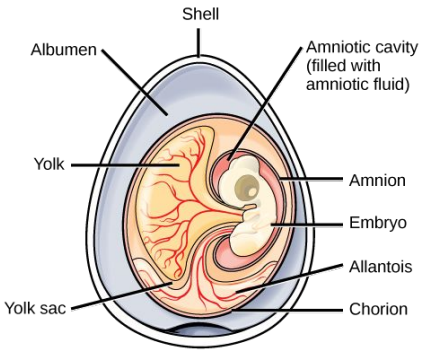
Reptiles (excludes Aves and Mammalia)

Phylogeny

- **Synapomorphy**: a shared derived character state
  - Amniotic eggs
- **Symplesiomorphy**: Character that is shared and ancestral.
  - Anamniotic egg
    - Jelly-like

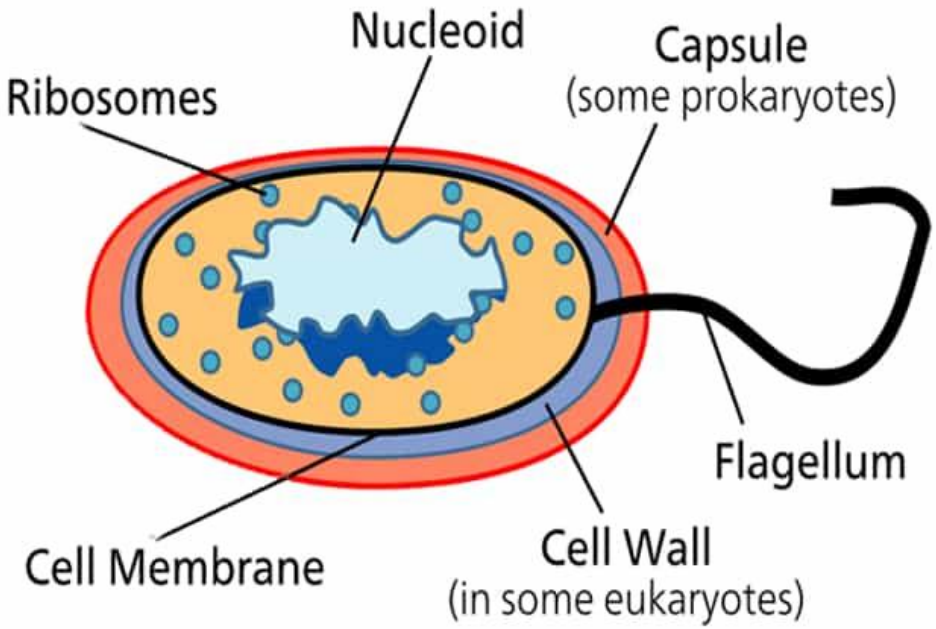


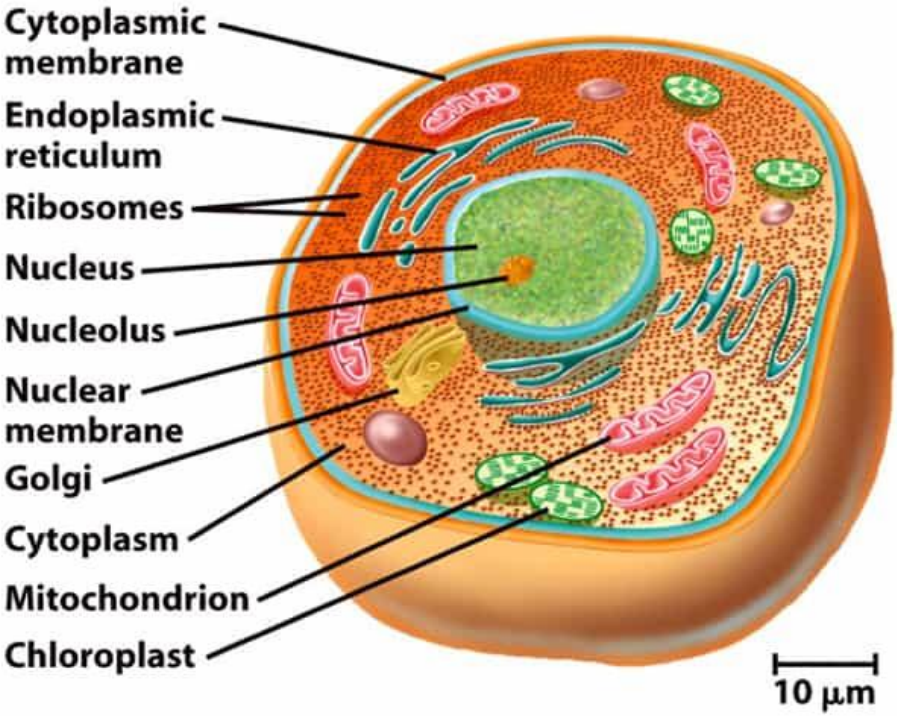




Chapter 3 organisms!

Prokaryote

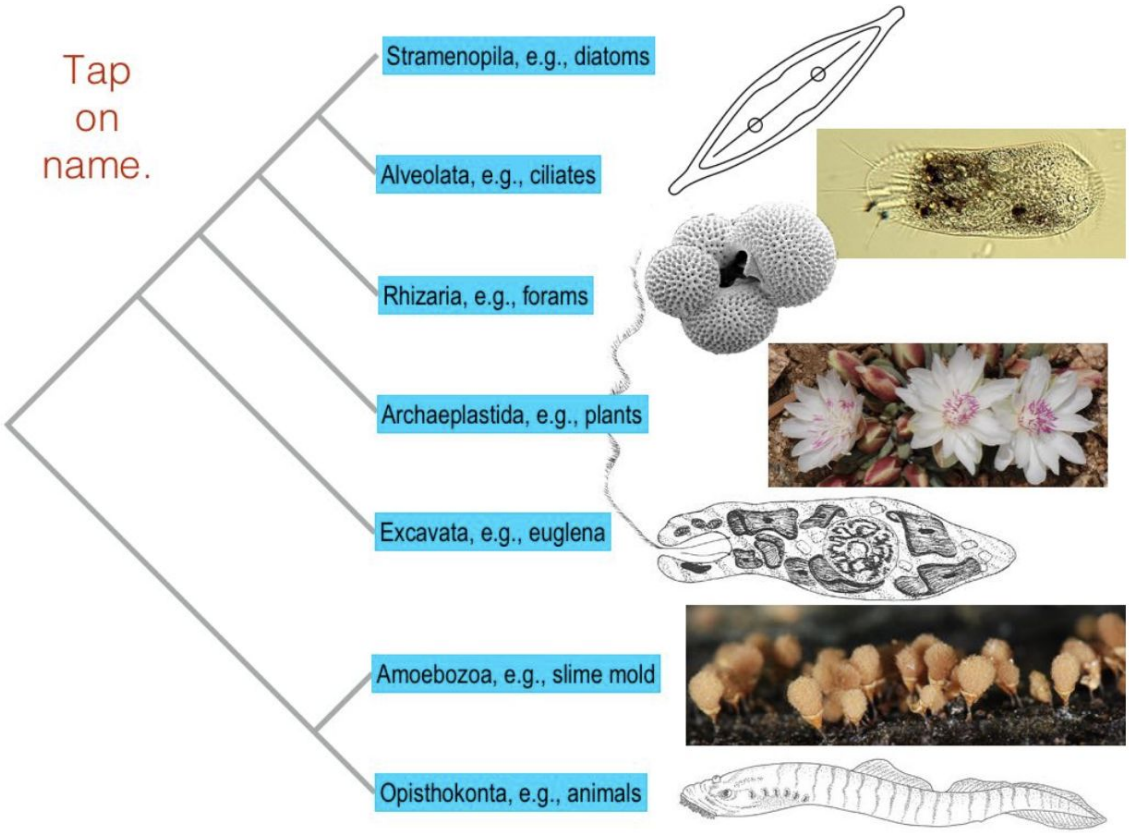




Eukaryote

Seven Eukaryotic Lineages

1. **Excavata**
2. **Alveolata**
3. **Stramenopila**
4. **Rhizaria**
5. Archaeplastida
6. **Amoebozoa**
7. Opisthokonta



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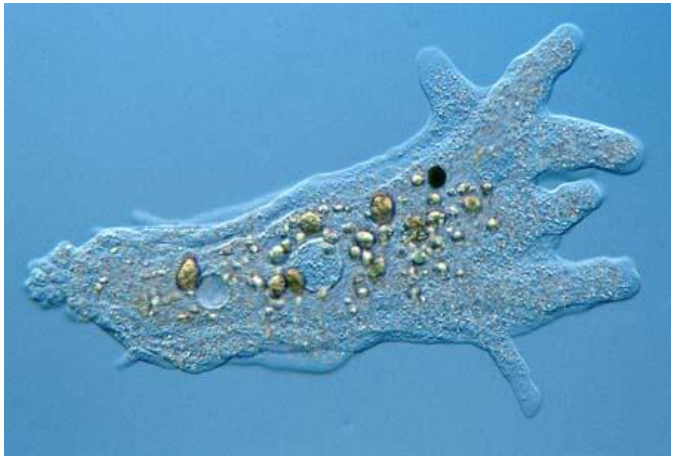
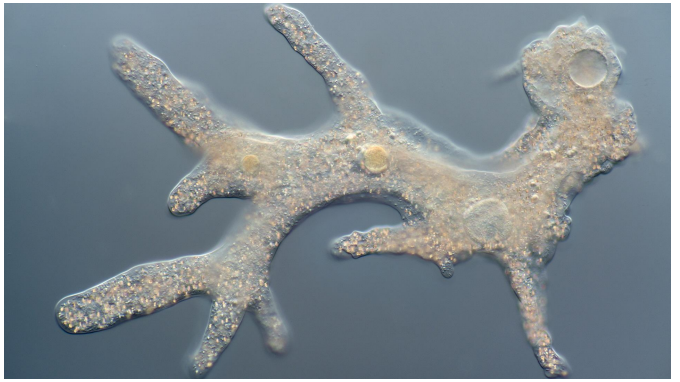
This week: heterotrophic unicellular eukaryotes

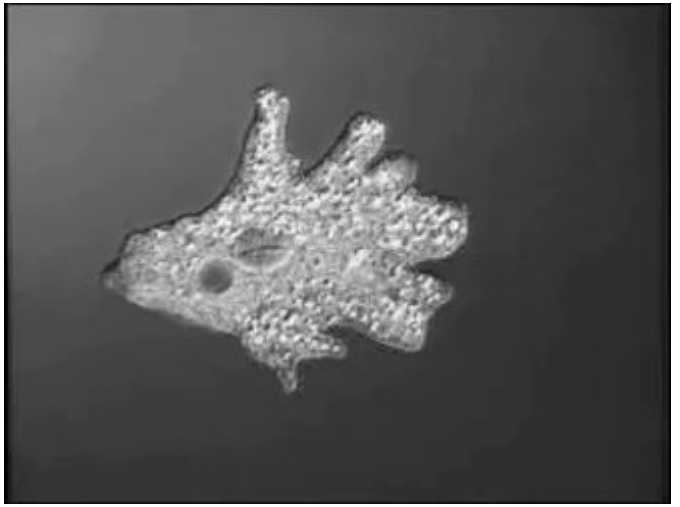
Lineage Amoebozoa

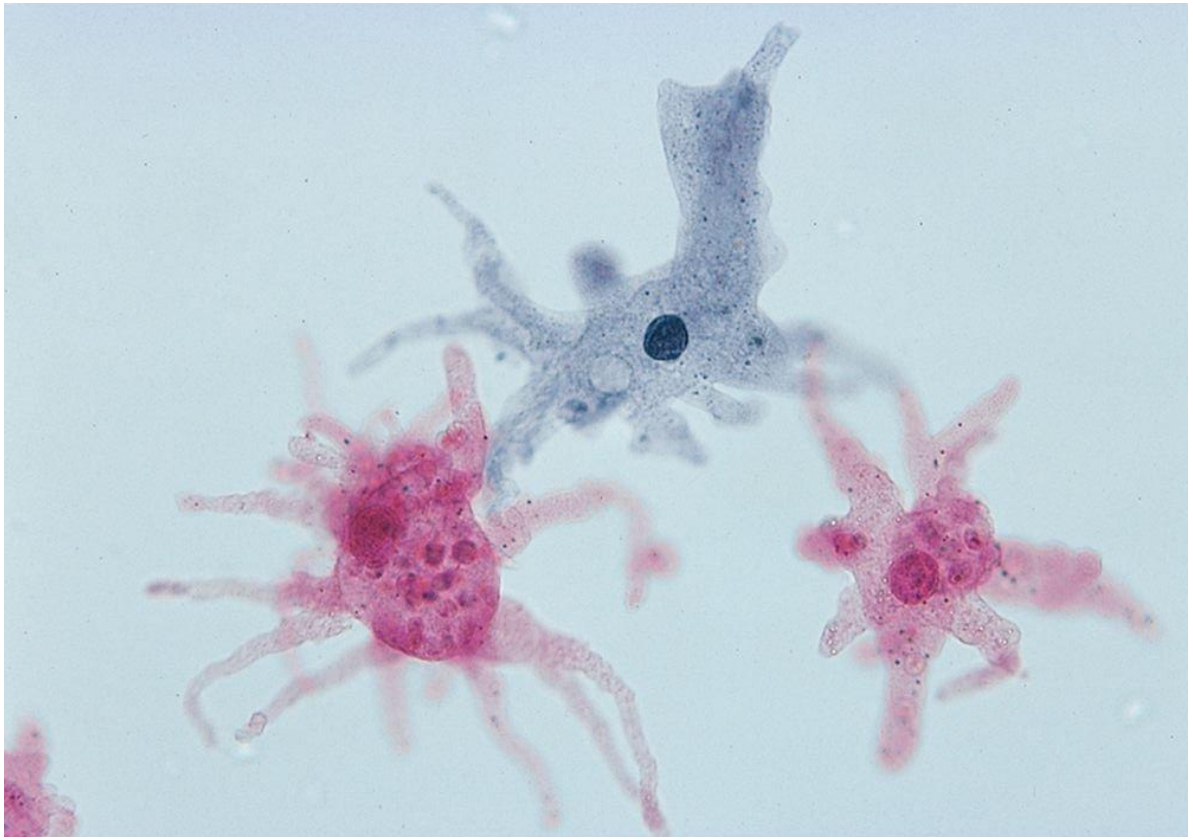
Amoeba

- Feed/move with pseudopodia
- Amoeboid movement
- Phagocytosis



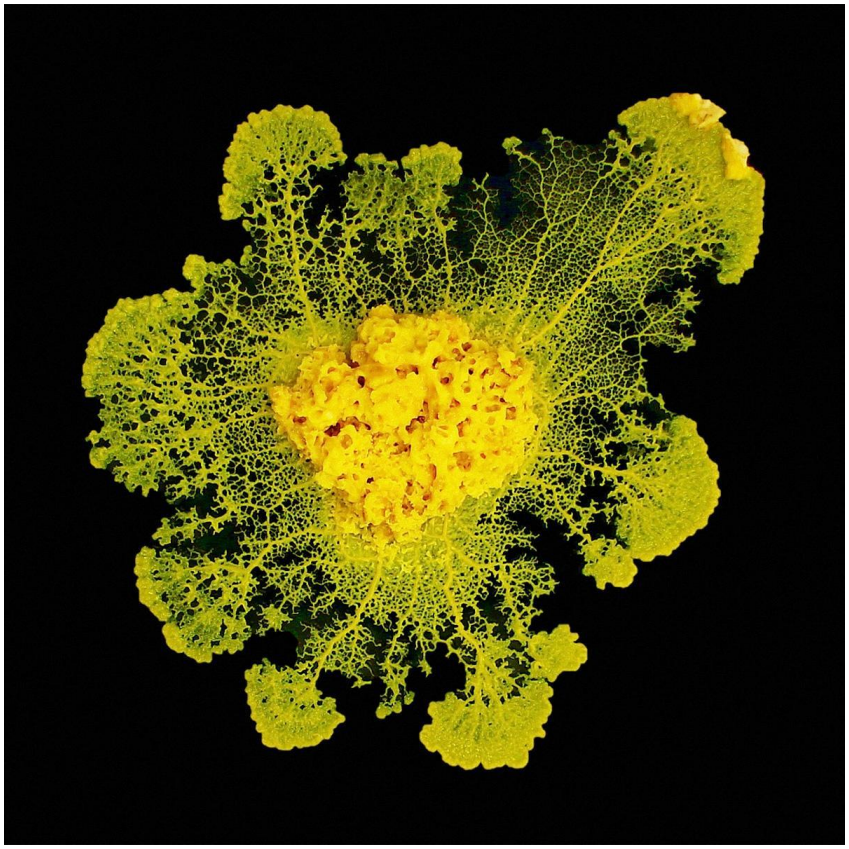






Physarum

- Slime mold (not a fungus)
- Amoeboid movement
- Single large cell, many nuclei

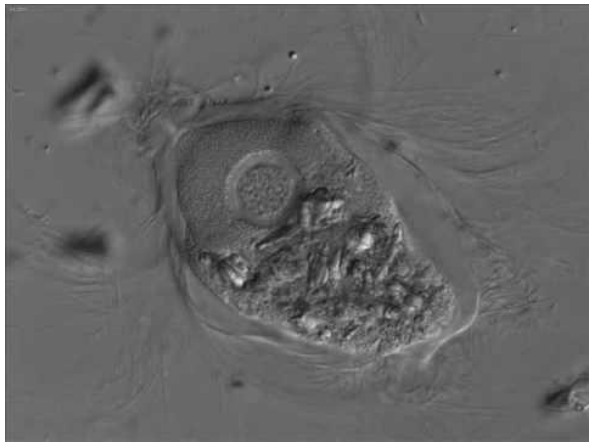


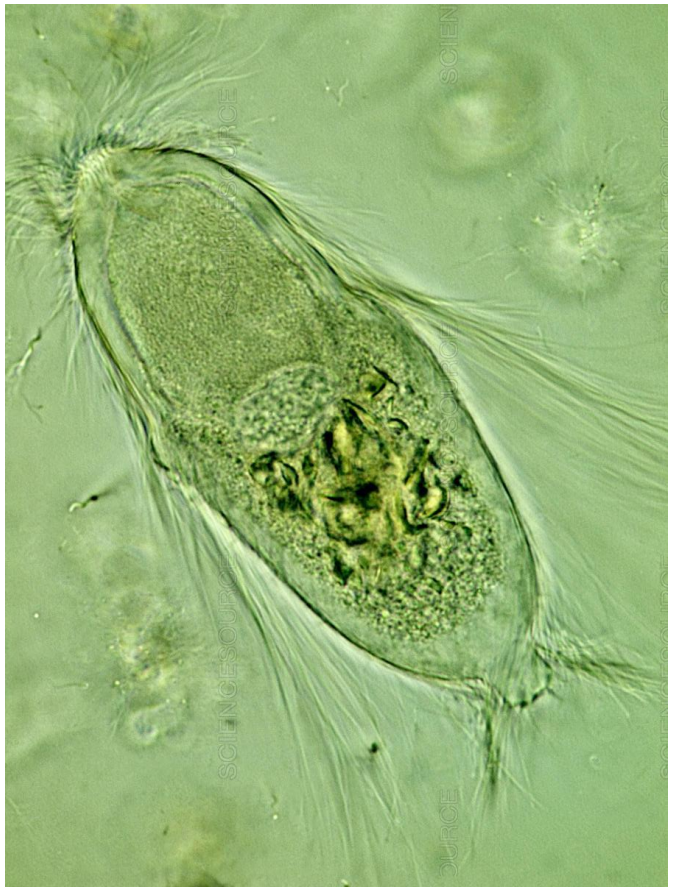
Lineage Excavata

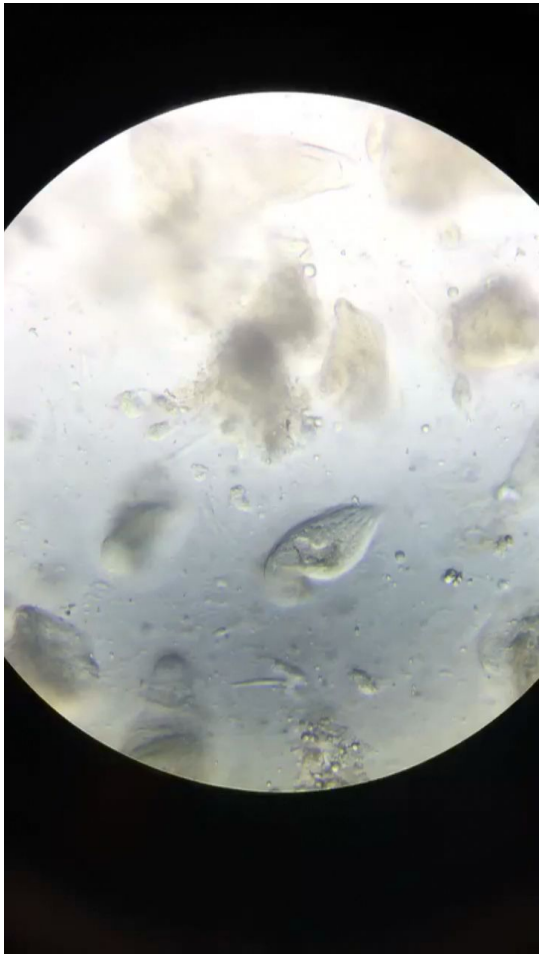
Trichonympha

Termite symbionts in gut

Have you ever wondered
how termites digest wood?

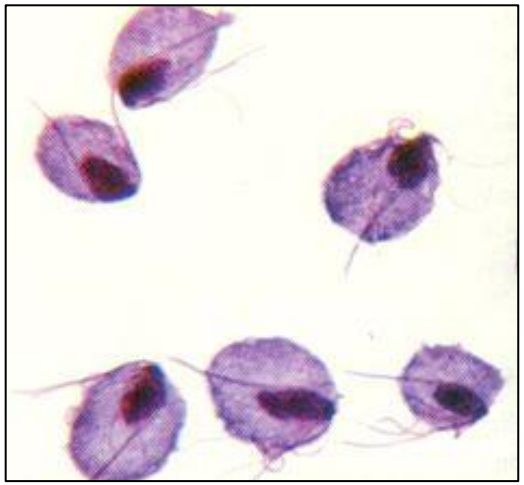


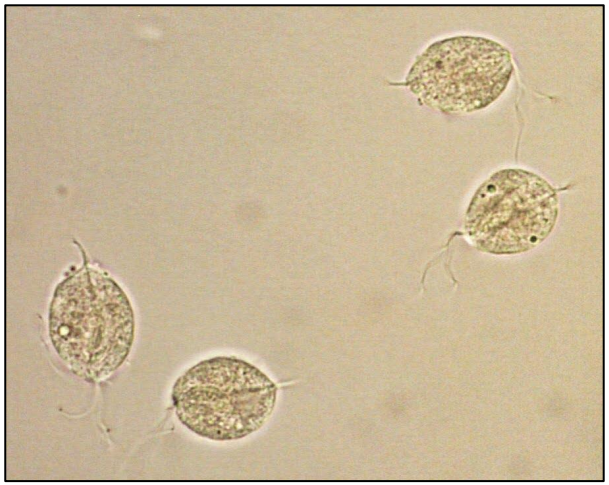


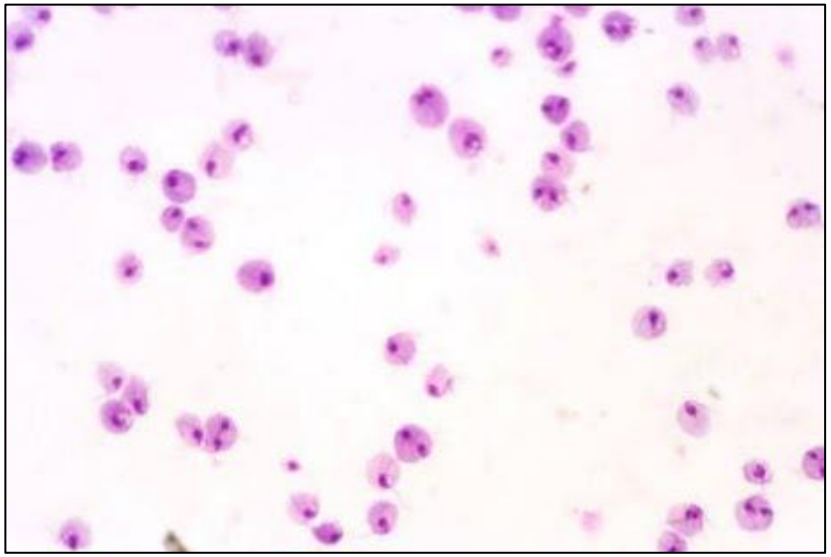


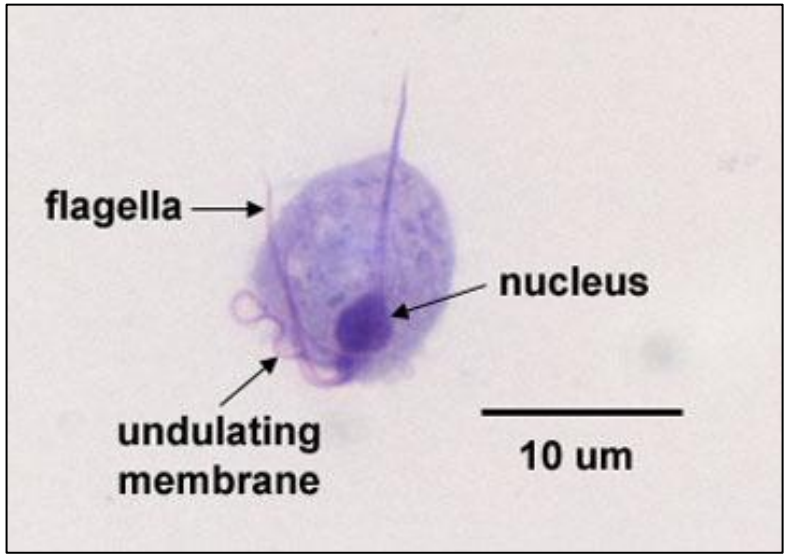
Trichomonas vaginalis

Sexually transmitted disease



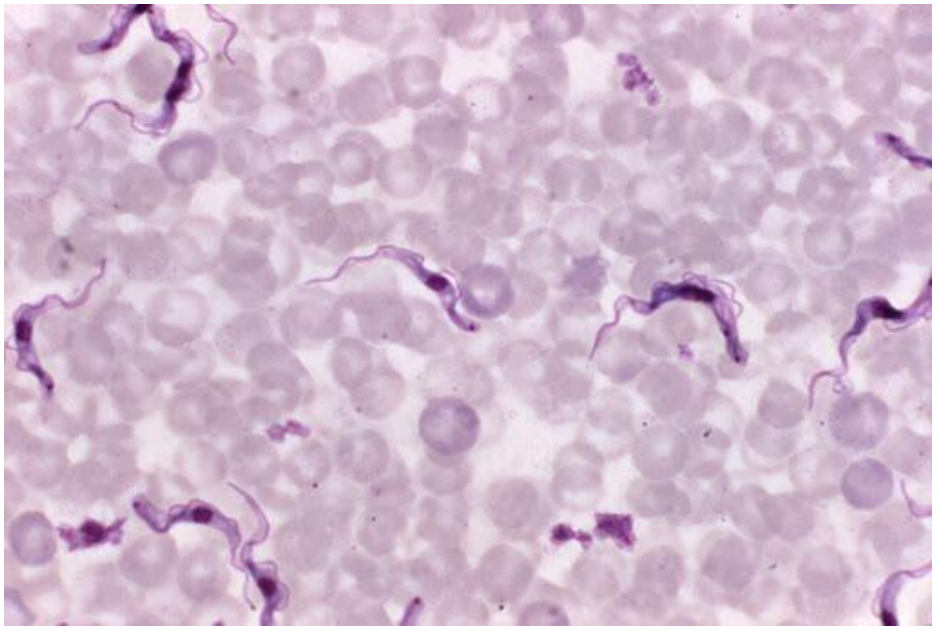


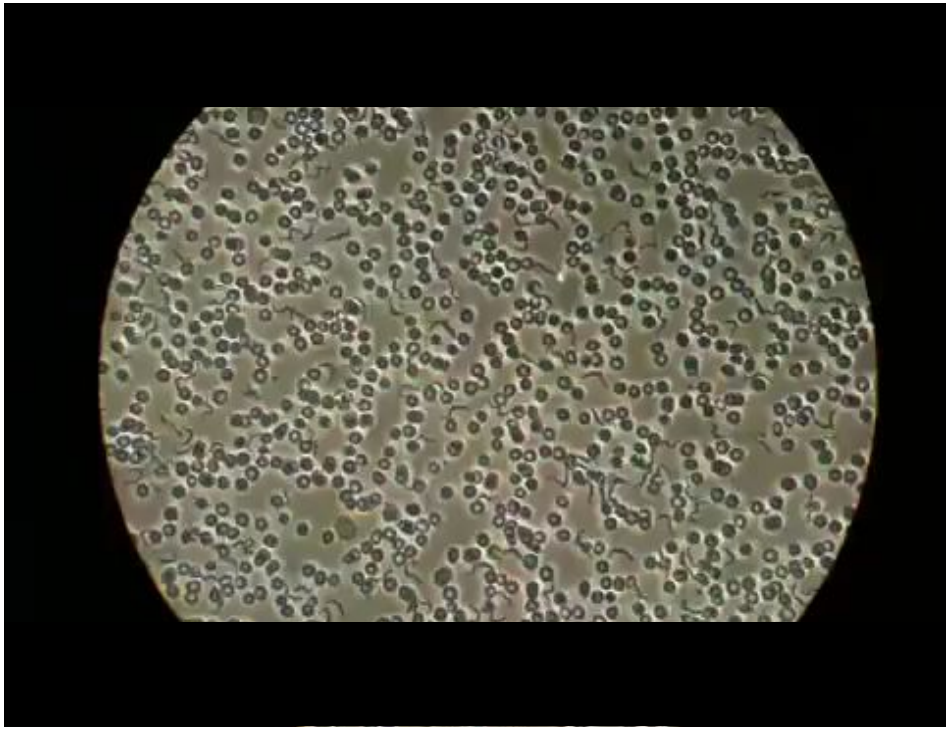




Trypanosoma brucei

- African sleeping disease
- Vector: Tsetse fly
- Outside of blood cells
- Flagellar movement

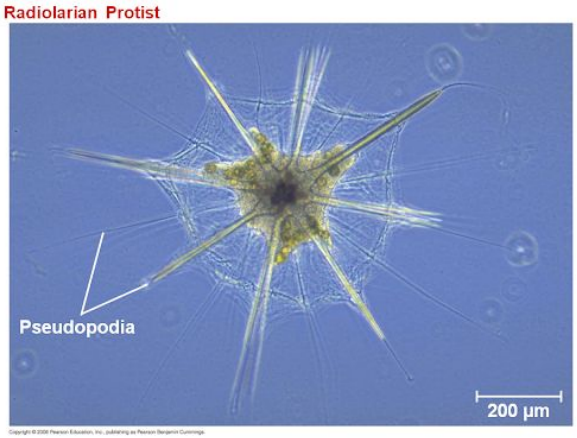


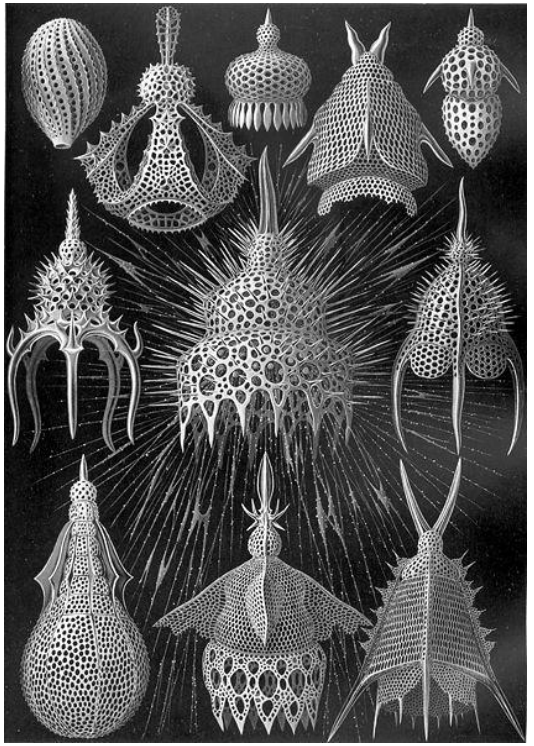


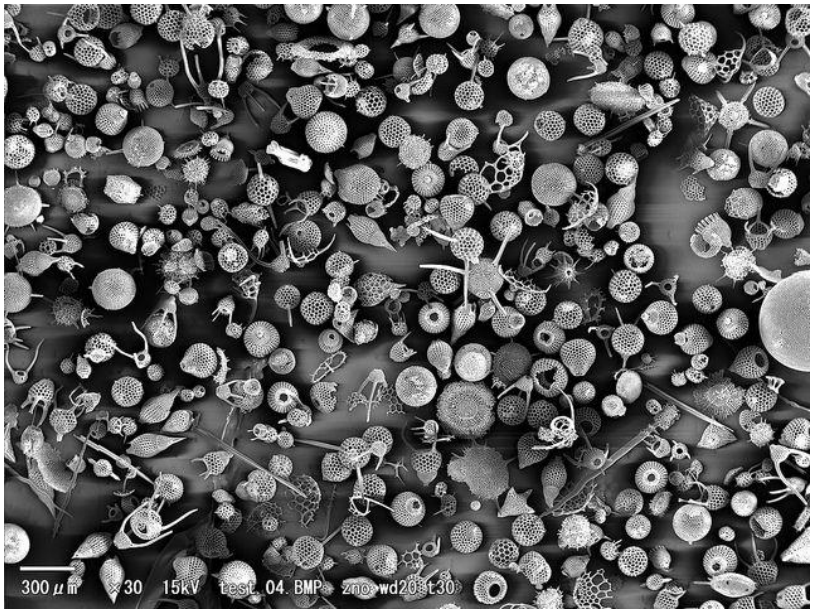
Lineage Rhizaria

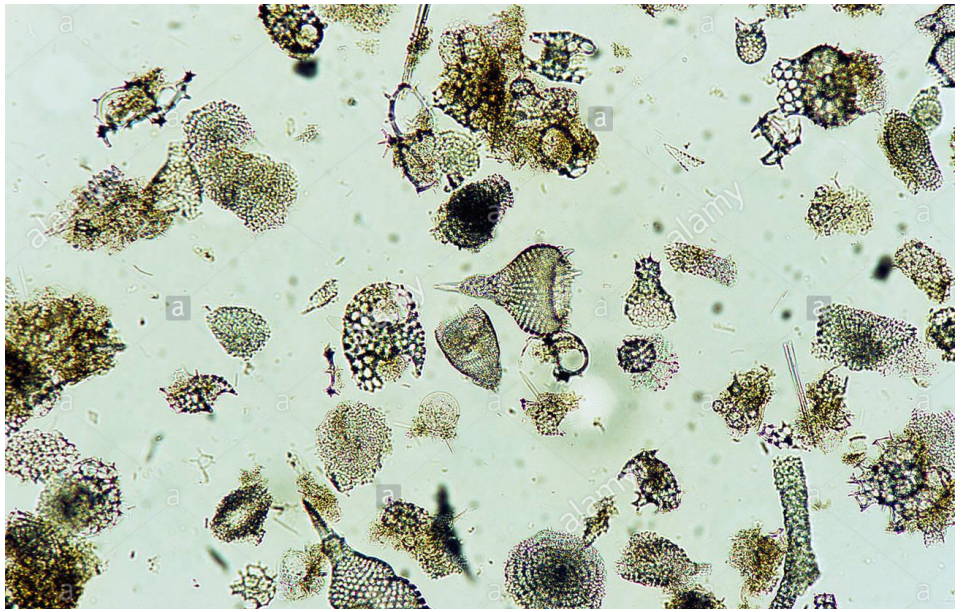
Radiolarians

- Amoeboid movement
- Elaborate mineral skeleton (usually silica)
- Axopodia (Pseudopodia)



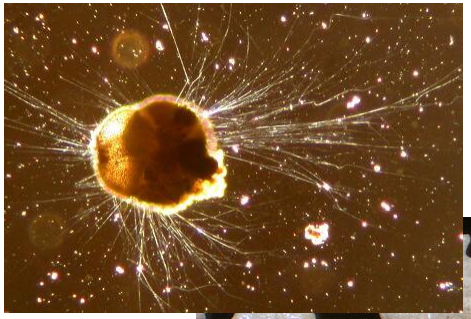


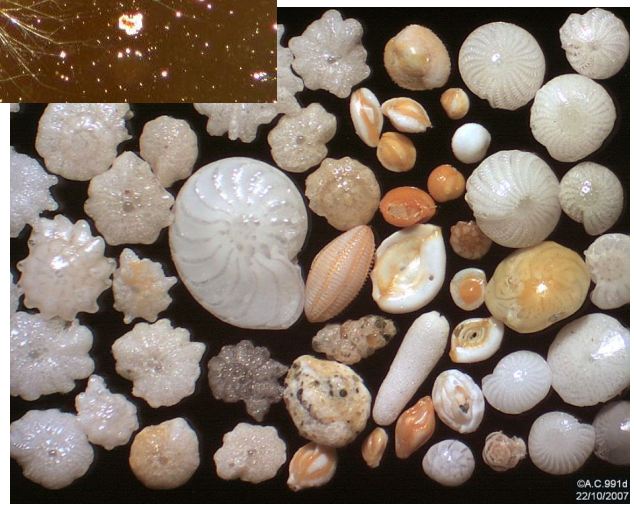




Forams

- Amoeboid movement
- Pseudopodia
- Calcium shells (look like sea shells)

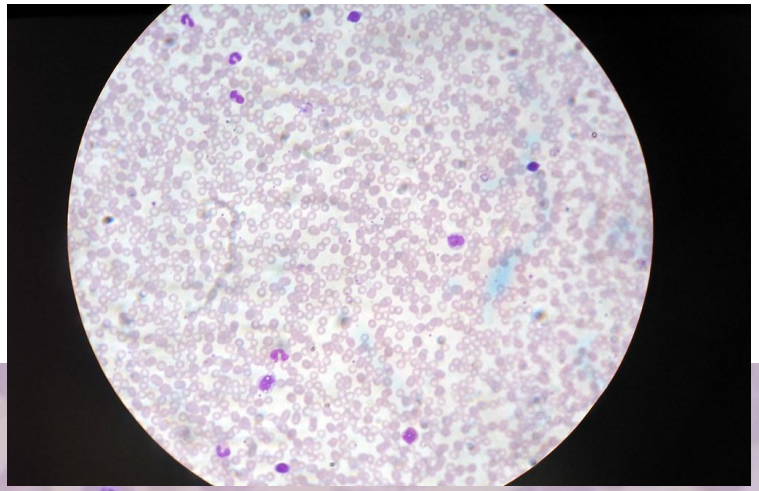


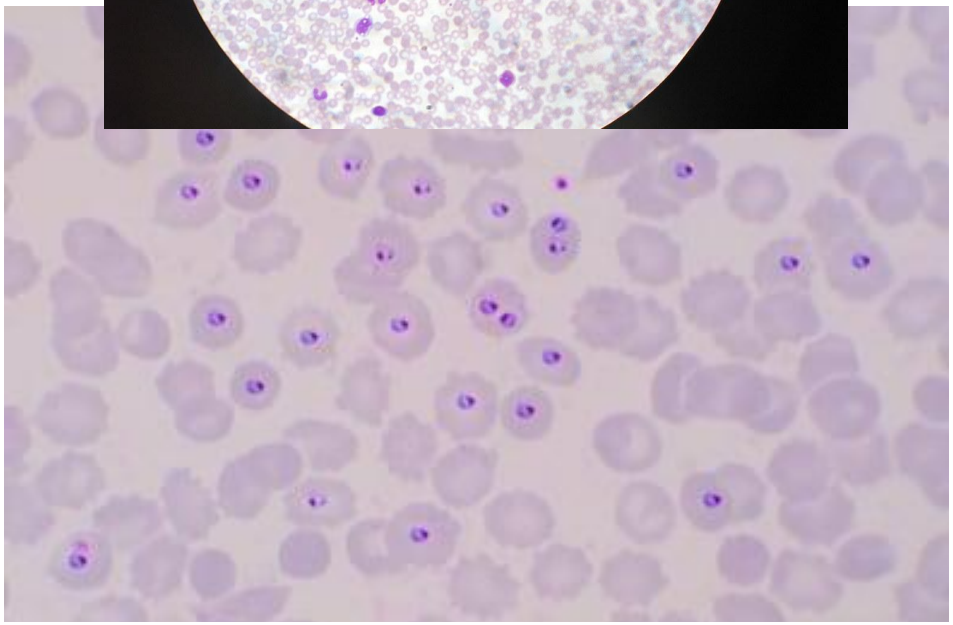


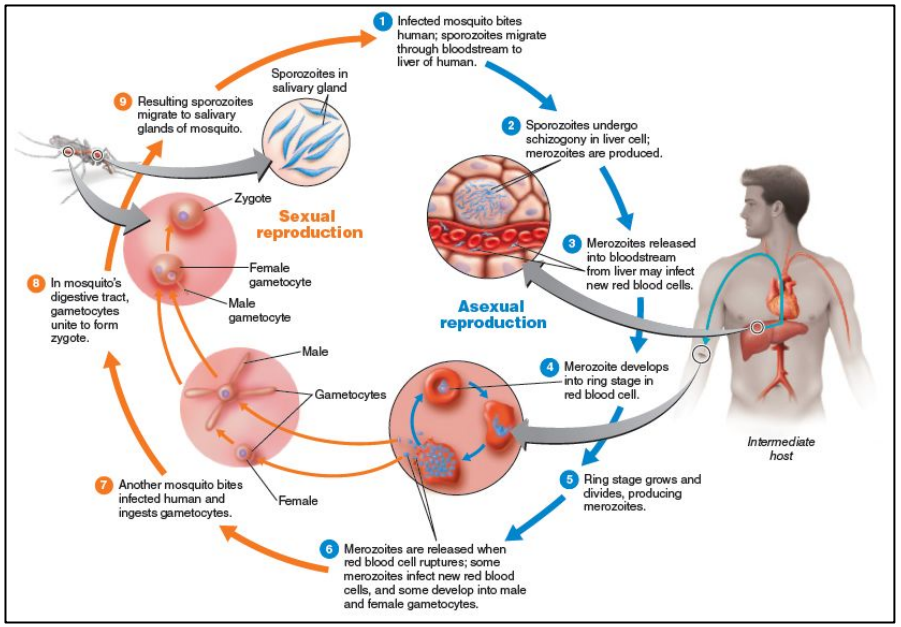
Lineage Alveolata

Plasmodium vivax

- Malaria
- Vector: mosquitos
- Inside blood cells

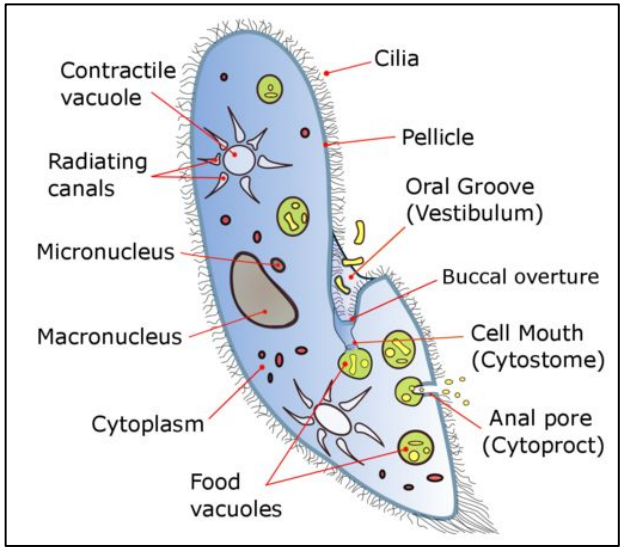






Paramecium

Movement/feeding by cilia



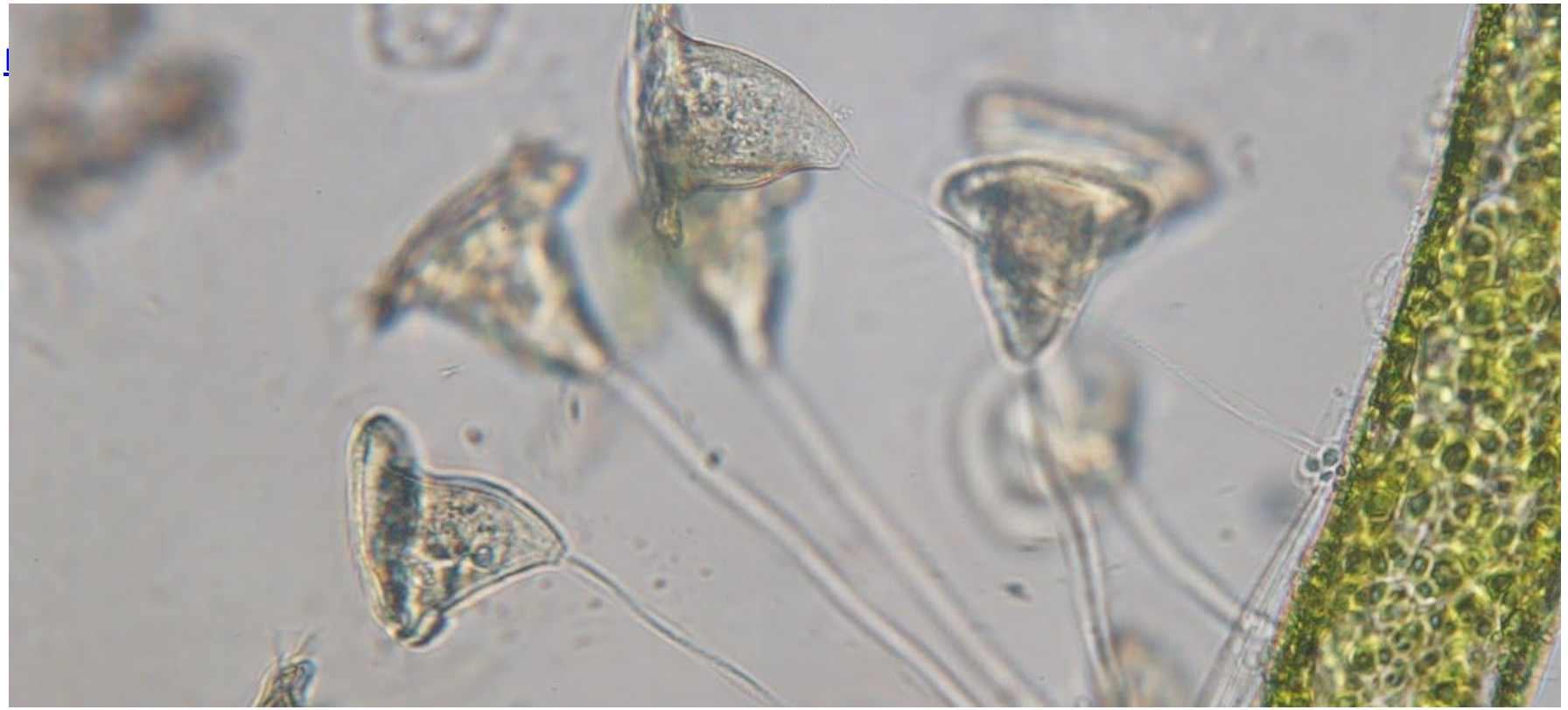
Euplotes

Movement by cilia

Can “walk” on cilia called cirri

Vorticella

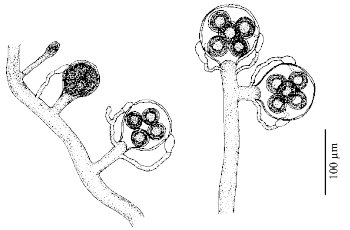
- Spring-like movement
- Cilia used for feeding
- Vortices

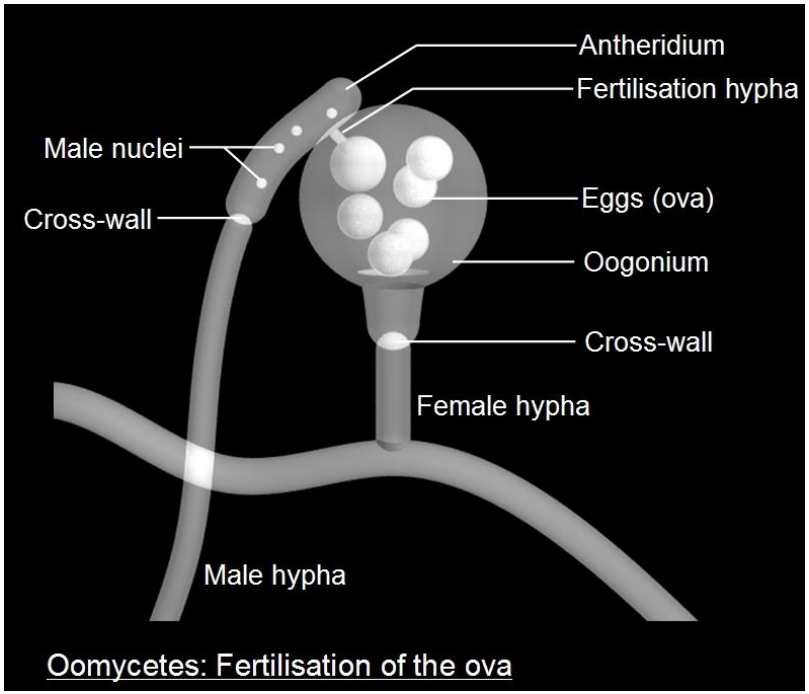


Lineage Stramenopila

Achlya

- Water mold (not a fungus)
- Cellulose rather than chitin
- Multiple nuclei
- Plant and animal pathogens





Lineage Amoebozoa

- Phylum Rhizopoda
  - ***Amoeba***
- Phylum Myxogastrida
  - ***Physarum***

Lineage Excavata

- Phylum Parabasalida
  - ***Trichonympha***
  - ***Trichomonas vaginalis***
- Phylum Kinetoplastida
  - ***Trypanosoma brucei gambiense***

Lineage Rhizaria

- Phylum Actinopoda
  - **Radiolaria**
- Phylum Foraminifera
  - **Foraminifera**

Lineage Alveolata:

- Phylum Apicomplexa
  - ***Plasmodium vivax***
- Phylum Ciliata
  - ***Paramecium***
  - ***Euplotes***
  - ***Vorticella***

Lineage Stramenopila

- Phylum Oomycota
  - ***Achlya***

Week 3 list of organisms

What you need to know for each organism:

- Identifying characteristics
  - Morphological
  - Anatomical
  - Diseases
  - Movement
  - Life cycles
  - Other general facts
- Classification
  - Lineage, phylum, genus

Thanks for watching!