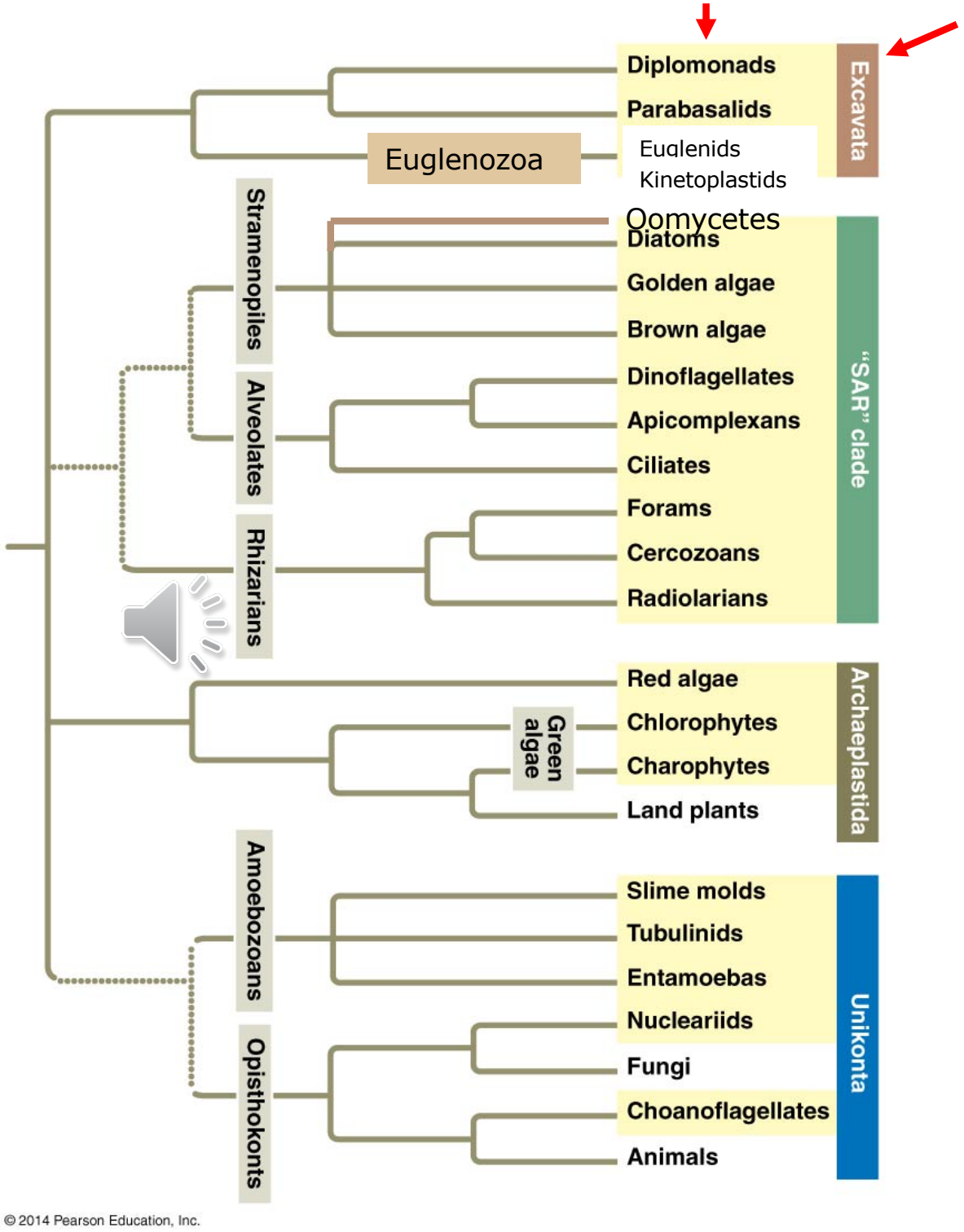
Origins of Eukaryotic Diversity – Protists Diversity

Rodophyta – Red Algae
Oomycetes – water molds
Chlorophyta - Green Algae
Bacillariorophyta - Diatoms
Phaeophyta– Brown Algae

Need to Know these:



Characteristics

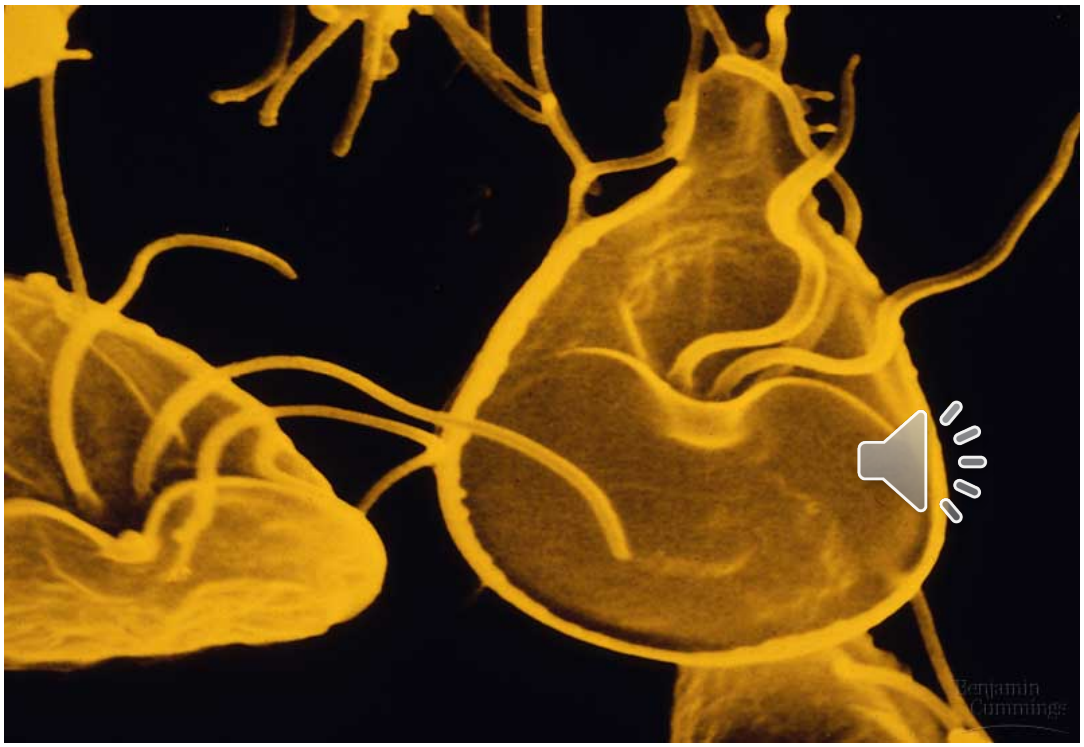
- Nucleus (Eukaryotic) Membrane-bound organelles
- Ribosomes (80s)
- Unicellular, Colonial, and Multicellular types

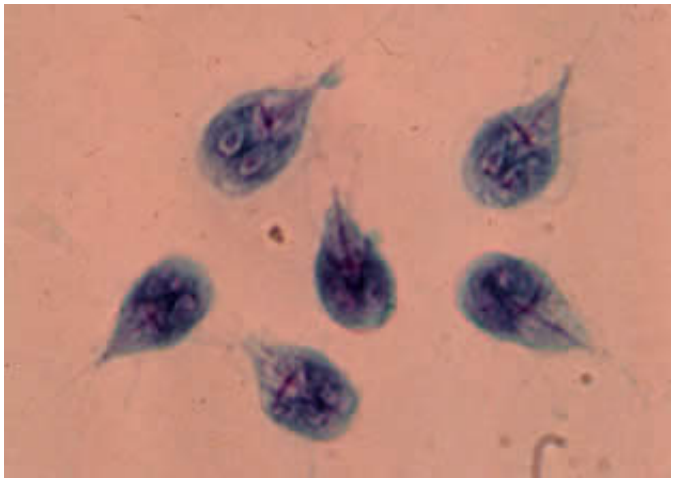
Four Supergroups:

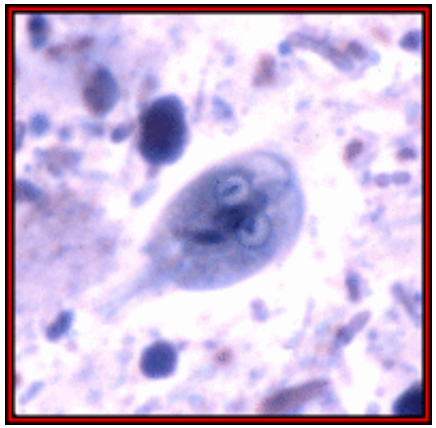
- _____
- _____ **(Stramenopiles, Alveolata, Rhizaria)**
- **Archaeplastida** (includes land plants)
- _____ (includes animals and fungi)

Supergroup: Excavata

Clade: _____





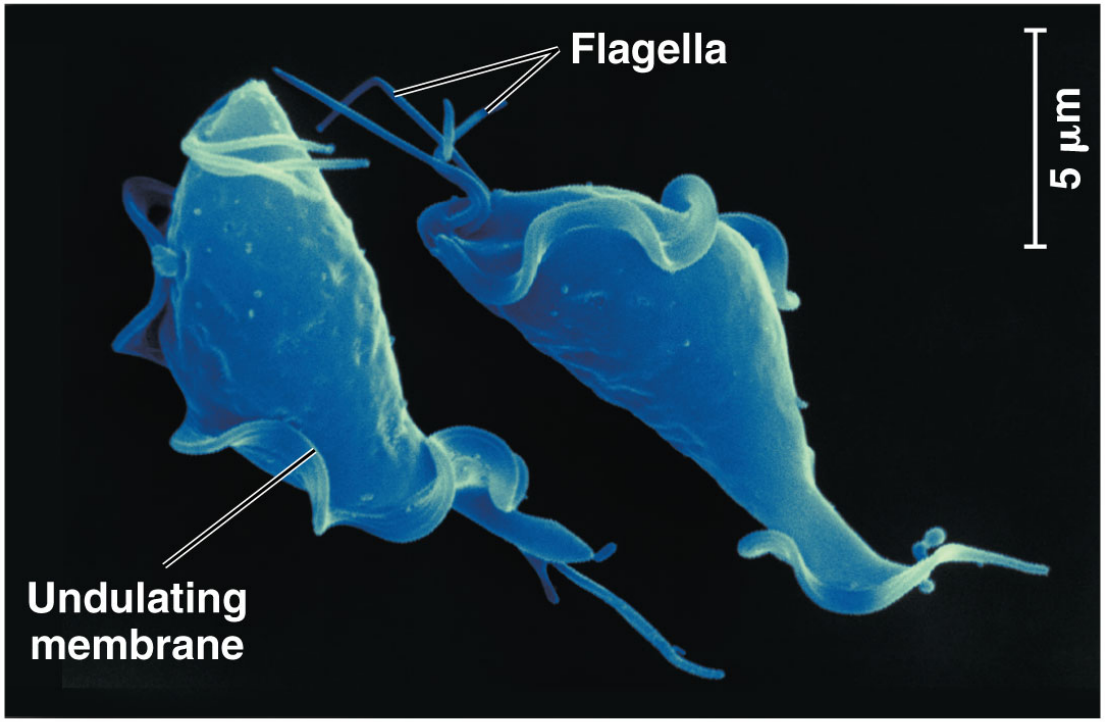


ex. *Giardia*

"excavated" groove on one side of the body (lack plastids, lack DNA in mitochondria, two _____ nuclei, flagella, simple cytoskeleton)

Supergroup: Excavata

Clade: Parabaslids



ex.

Trichimonas

(Causes Trichomoniasis)

"excavated" groove on one side of the body

(lack plastids, lack DNA in mitochondria, Undulating Membrane)

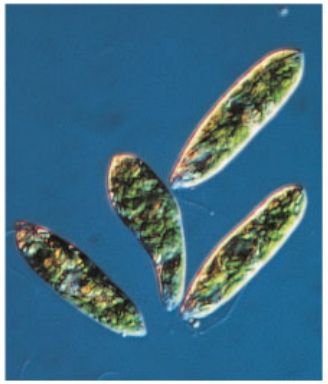
Supergroup: Excavata

Clade: Euglenozoa

"excavated" groove on one side of the body

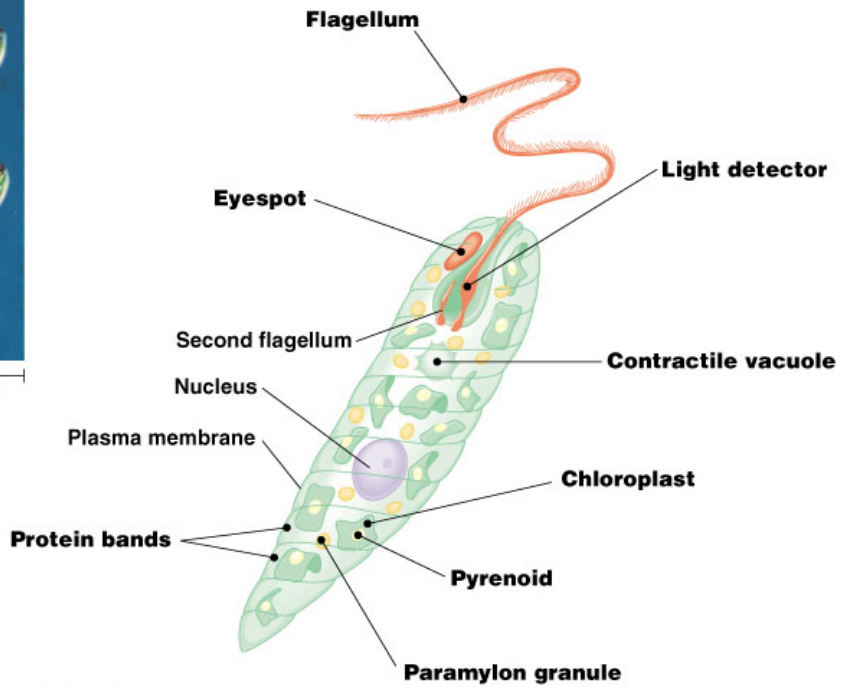
- Move by _____ with spiral or crystalline rod
- 2 Groups:
  - Euglenids
  - Kinetoplastids

Supergroup: Excavata
Clade: Euglenozoa
Group: Euglenids



Euglena (LM)

0 µm

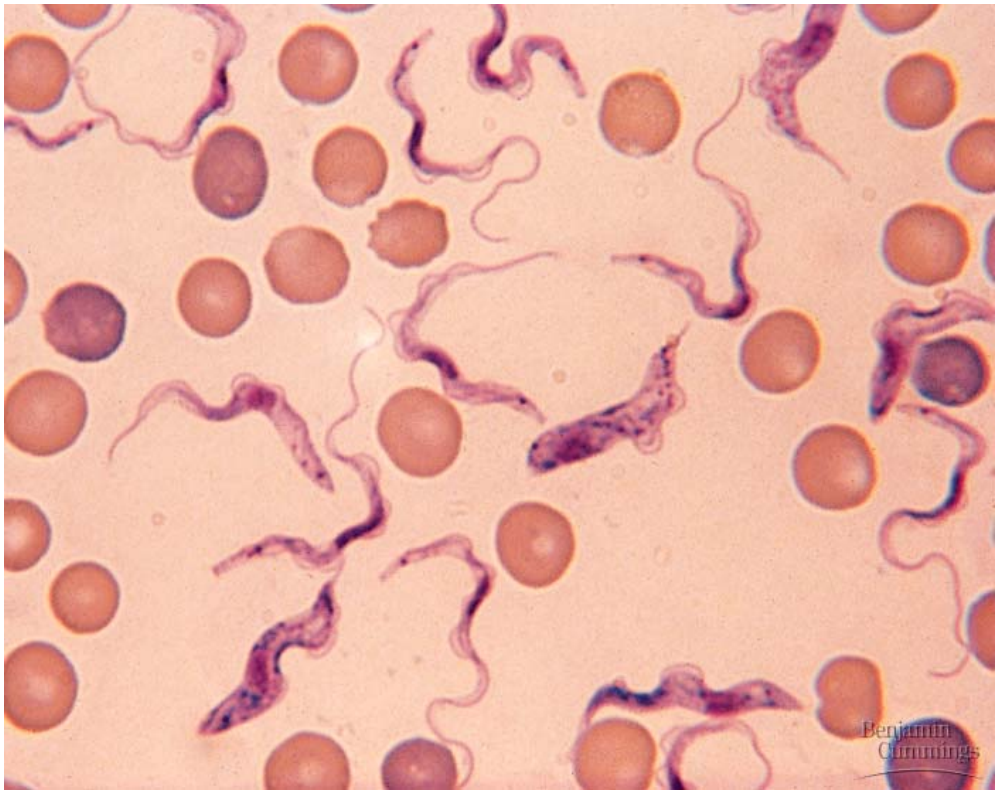


ex. *Euglena*

(anterior pocket with flagella)

Supergroup: Excavata
Clade: Euglenozoa
Group: Kinetoplastids

ex. _____



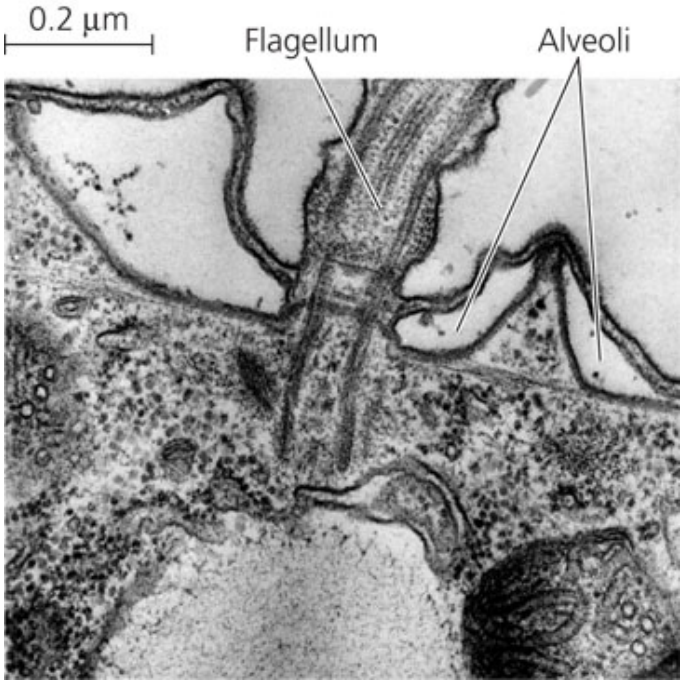
(single large mitochondria with kinetoplast - organized mass of DNA)

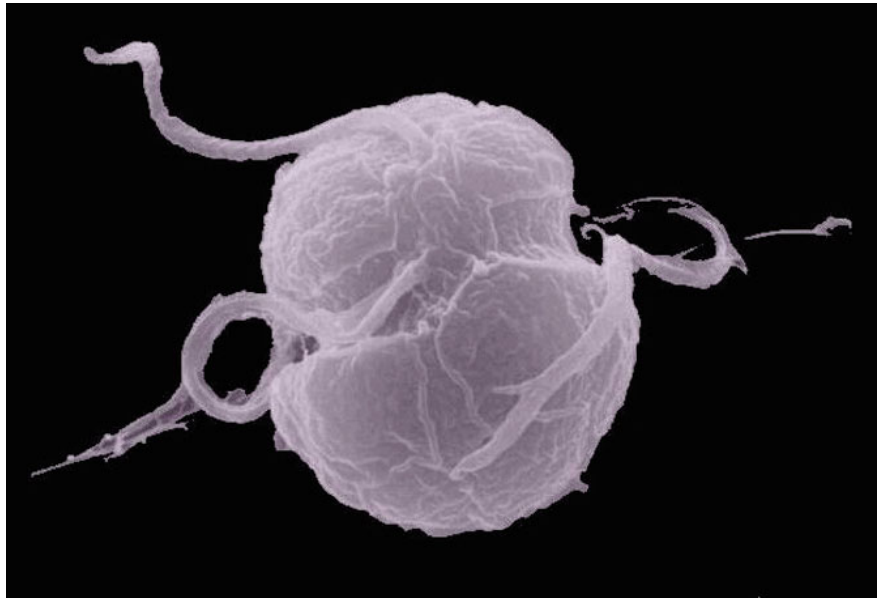
Trypanosoma brucei (African Sleeping Sickness)

Trypanosoma cruzi (Chagas Disease)

Supergroup: SAR
Clade: Alveolata

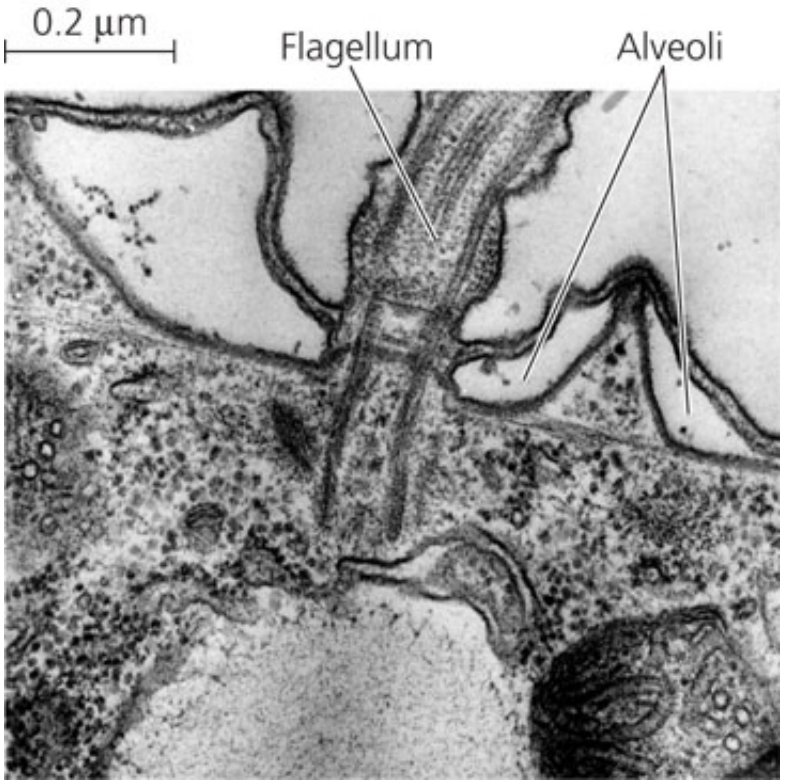
- Supergroup Char: DNA
- Clade characteristics: Contain Alveoli (membrane-bounded sacs) beneath their cell surface
- 3 Groups:
  - Dinoflagellates
  - Apicomplexans
  - Ciliates





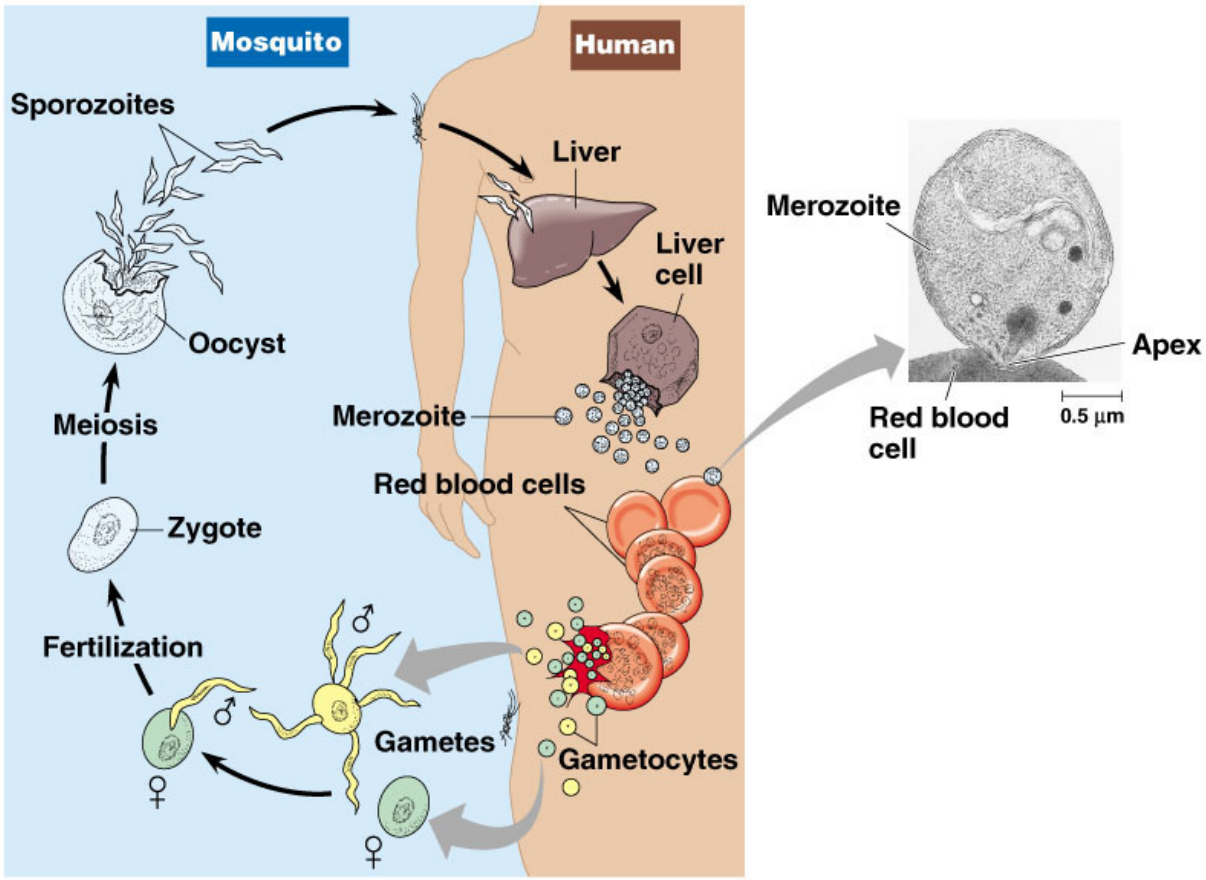
Supergroup: SAR
Clade: Alveolata

Group:
Dinoflagellates



(2 _____
located within a
groove,
_____)

Supergroup: SAR
Clade: Alveolata



group: Apicomplexans

ex. *Plasmodium* _____

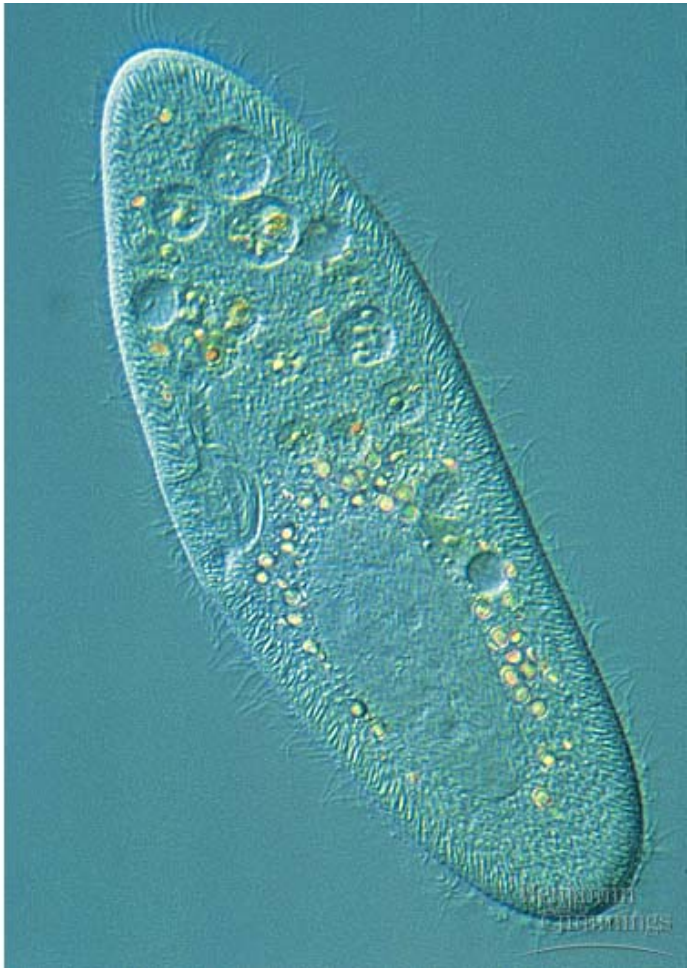
(parasitic, apical structure)

Cause of _____


COUNTY COUNCIL OF TRANSMARA
MARA CONSERVANCY
WELCOME
TO MARA TRIANGLE
06/19/2010


06/18/2010

Supergroup: SAR
Clade: Alveolata
Group: Ciliates (have Cilia used for movement)

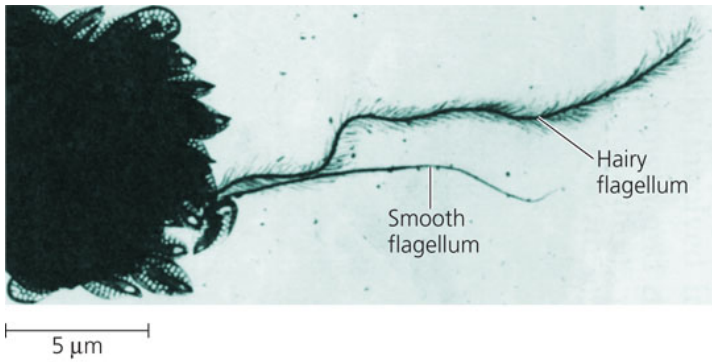


Supergroup: SAR

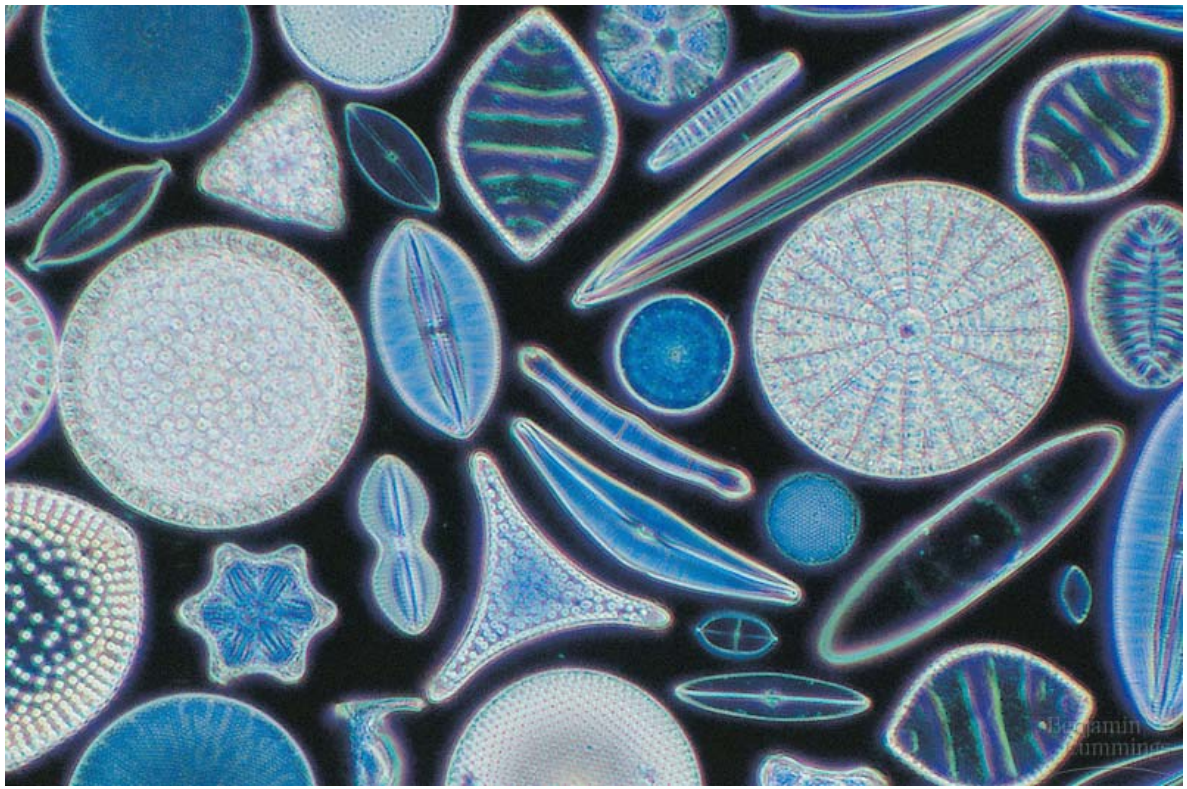
Clade: Stramenopiles

- Supergroup Char: DNA
- Clade characteristics: Have hair-like projections on flagella
- Four Groups:
  - Diatoms (Bacillariophyta)
  - Golden Algae (Chrysophyta)
  - Brown Algae (Phaeophyta)
  - Water Mold (Oomycetes)

You should know both sets of words



Supergroup: SAR
Clade: Stramenopiles
Groups: Diatoms



Overlapping Silica _____ _____

pigments: carotene, xanthophyll,

-_____ earth,

-Filters

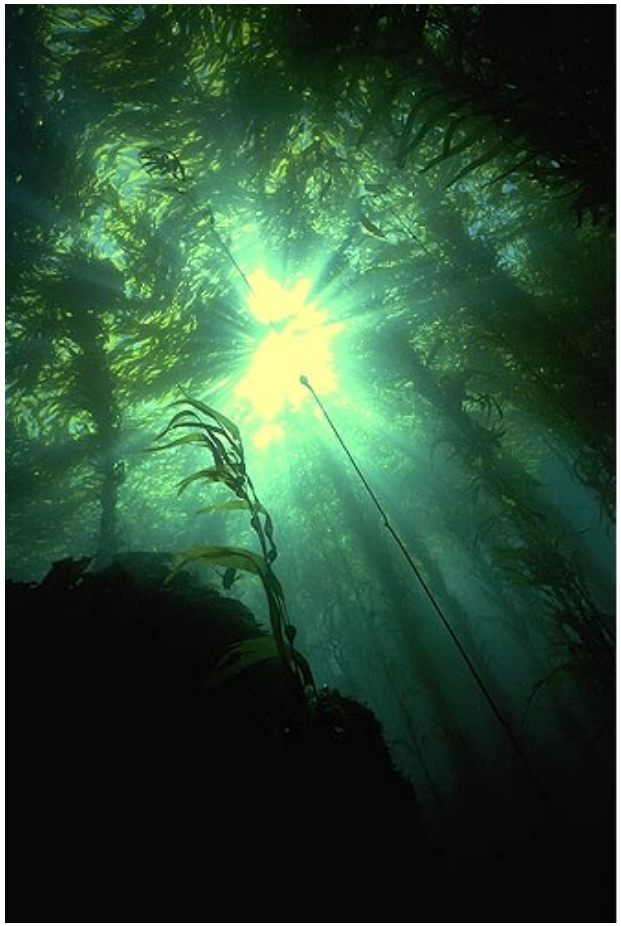
-Fertilizing the oceans

Supergroup: SAR
Clade: Stramenopiles
Groups: Golden Algae (Chrysophyta)

cell wall: **Silica**

pigments: carotene,
xanthophyll

Supergroup: SAR
Clade: Stramenopiles
Groups: Brown Algae



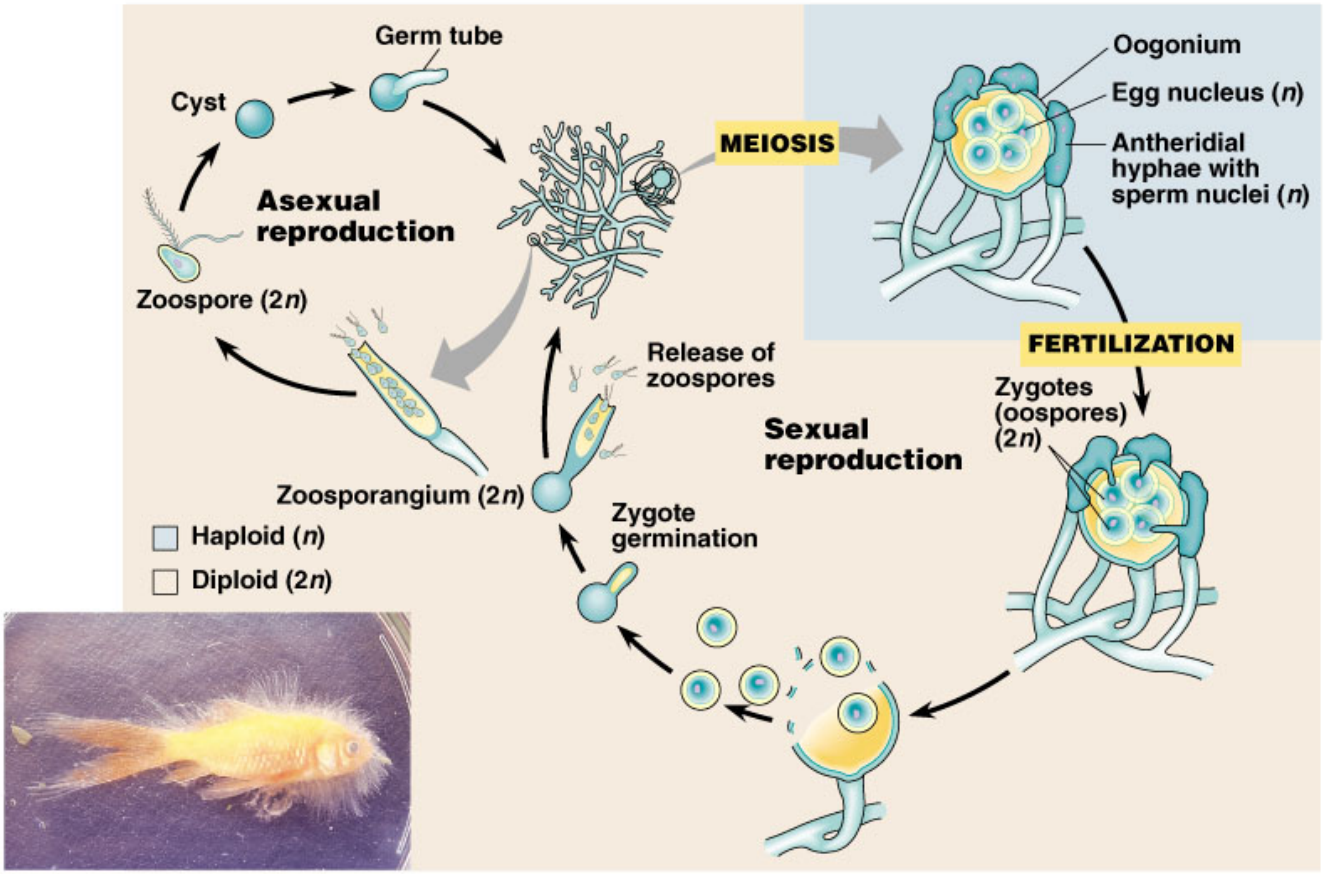
cell wall:

_____,

algin

Alternation of generations

Supergroup: SAR
Clade: Stramenopiles
Groups: Water Molds (Oomycetes)



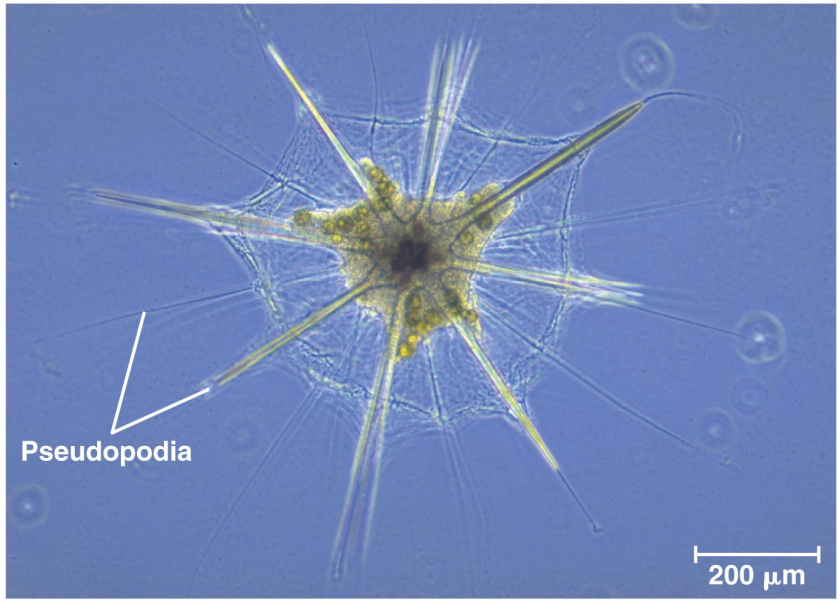
pigments:none
cell wall: cellulose,
coenocytic (aseptate) hyphae

_____ Potato Famine, French Wine Crisis (1800's)

Saproglenia

SAR (Rhizaria)

- Thin pseudopodia Used for movement and feeding
- Groups:
  - Cercozoans
  - Foraminiferans
  - Radiolarians



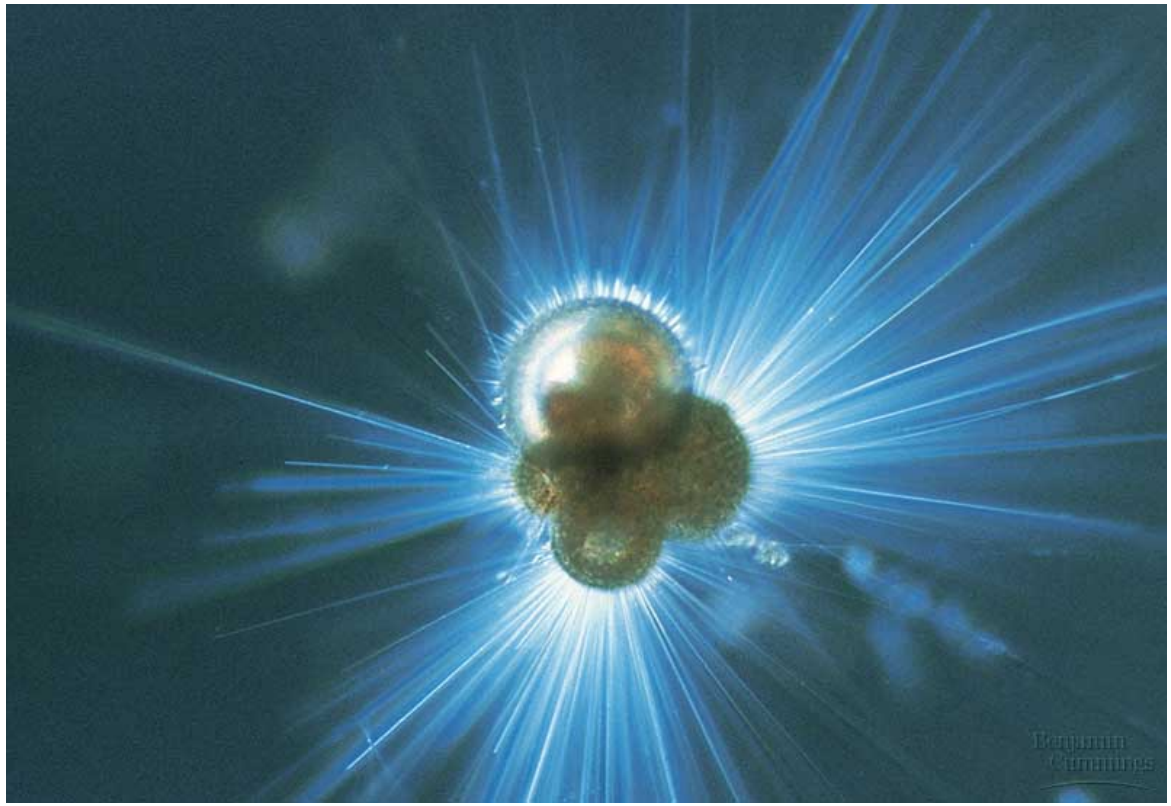
Supergroup: SAR

Group: Cercozoans

Plastids surrounded by four membranes (secondary endosymbiosis).

Sausage Shaped chromatophore

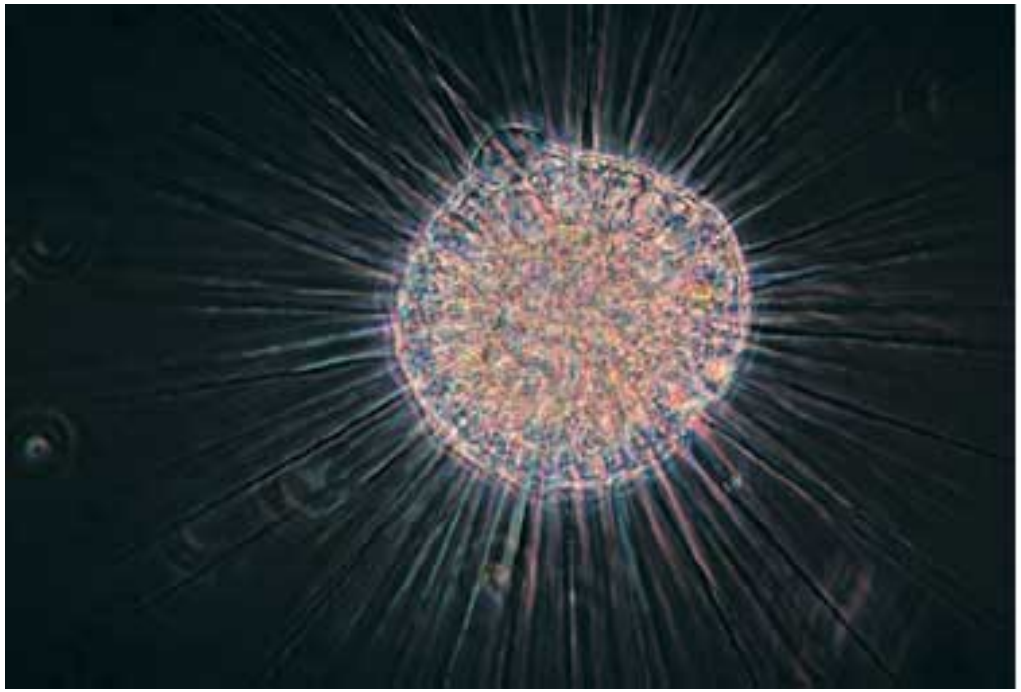
Supergroup: SAR (Rhizaria)
Group: Foraminiferans (Forams)



porous shells –
made of
Calcium Carbonate

Supergroup: SAR (Rhizaria)
Group: Radiolarians

Actinopods (fused plates – silica with axopodia)

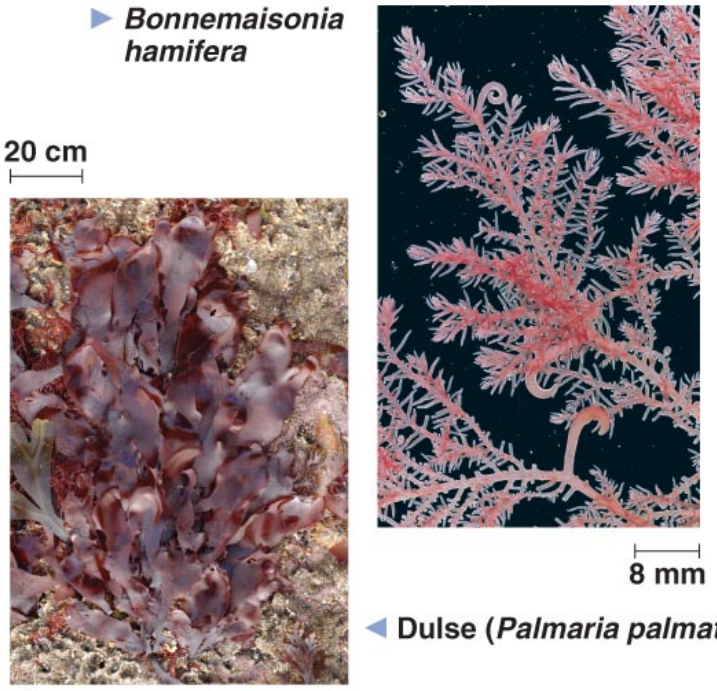


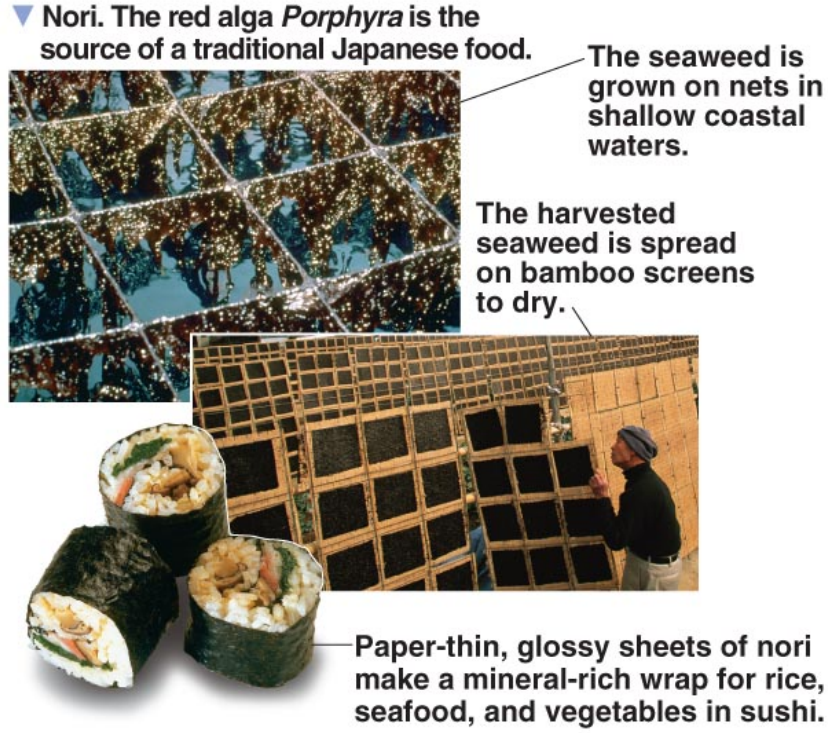
Supergroup: Archaeplastida

- Ancient protists that engulfed a cyanobacterium
- Three Groups:
  - Red Algae (Rodophyta)
  - Green Algae (Chlorophyta)
  - Land Plants

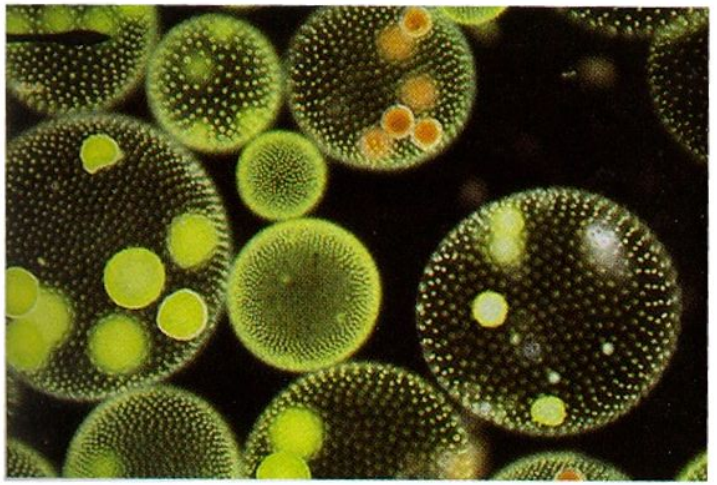
Supergroup: Archaeplastida Group: Rhodophyta (Red)

- Red Algae
- Phycoerythrin
- "Nori"





Supergroup: Archaeplastida Group: Chlorophyta (& Charophytes)



Green Algae

Have Chloroplasts similar to plants

(a) *Ulva*, o

Supergroup: Unikonta

- Very Diverse Group
- Molecular Systematics links groups (but highly debatable)
  - Two Clades:
    - Amoebozoans
    - Opisthokonts

Supergroup: Unikonta

Clade: Amoebozoans

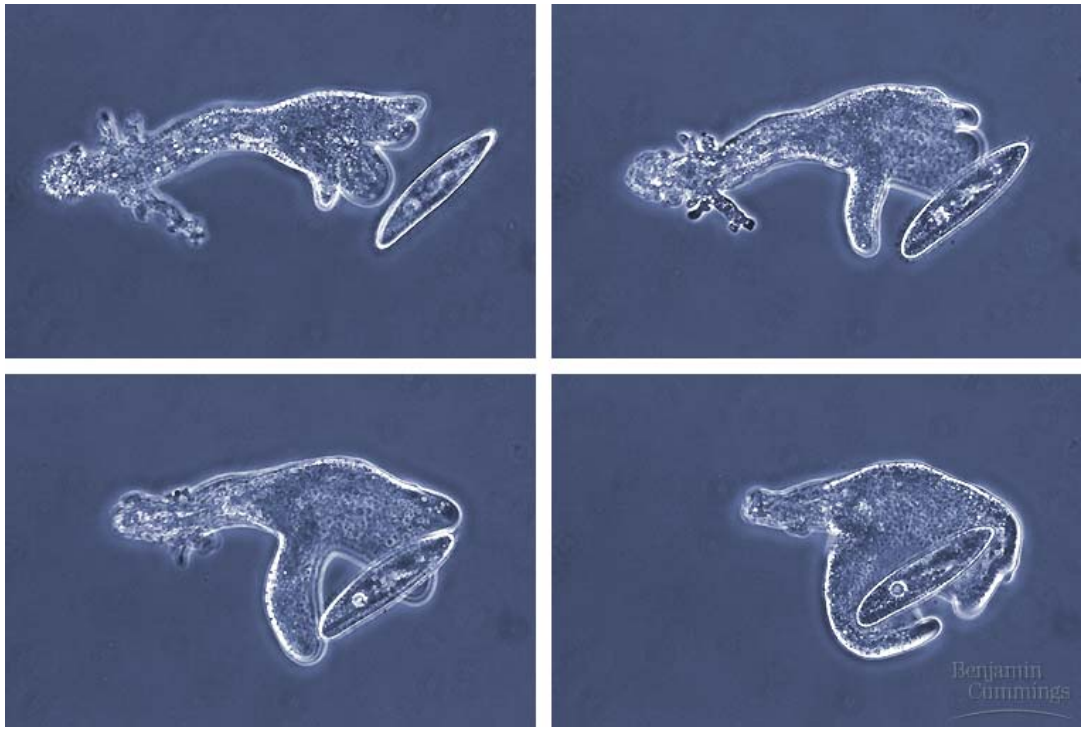
Group:Slime Molds

Group:Gymnamoebas

Group:Entamoebas

- Many With Lobe or tube shaped

Pseudopodia



Supergroup: Unikonta
Clade: Amoebozoans

Group:Slime Molds
Group:Gymnamoebas
Group:Entamoebas

- Produce fruiting body that aids in spore dispersal
- **Plasmoidial** – NOT **Multicellular**
- From a plasmodium (feeding stage) single mass of cytoplasm with many nuclei
  – diploid

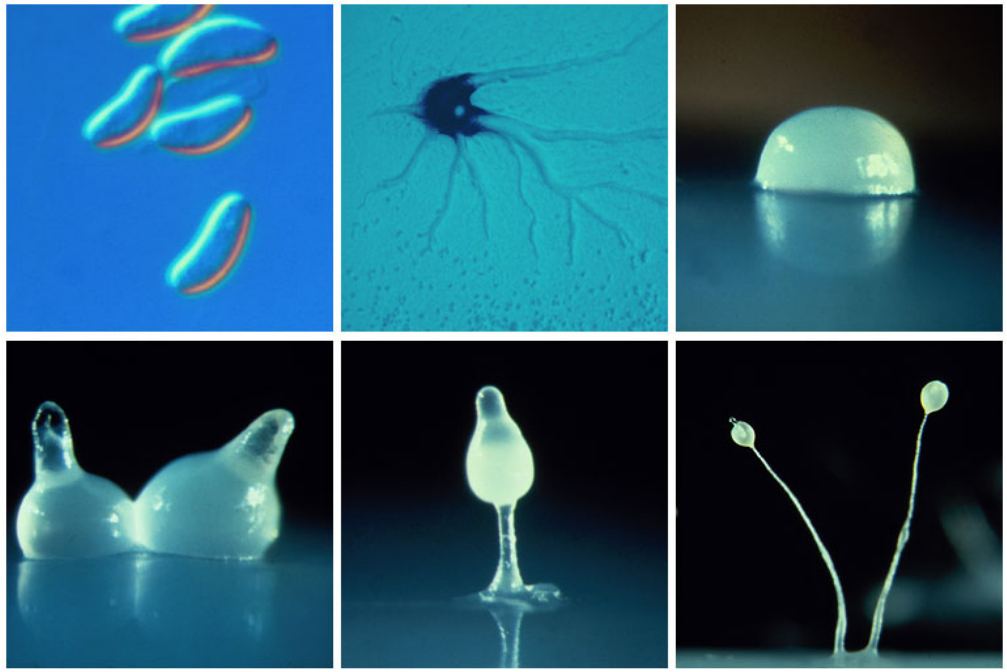
Supergroup: Unikonta

Clade: Amoebozoans

Group:Slime Molds

Group:Gymnamoebas

Group:Entamoebas



- Produce fruiting body that aids in spore dispersal
- **Cellular**
- (feed like individual amoebas)
  - aggregate to breed or during stress

Haploid Organisms

Supergroup: Unikonta

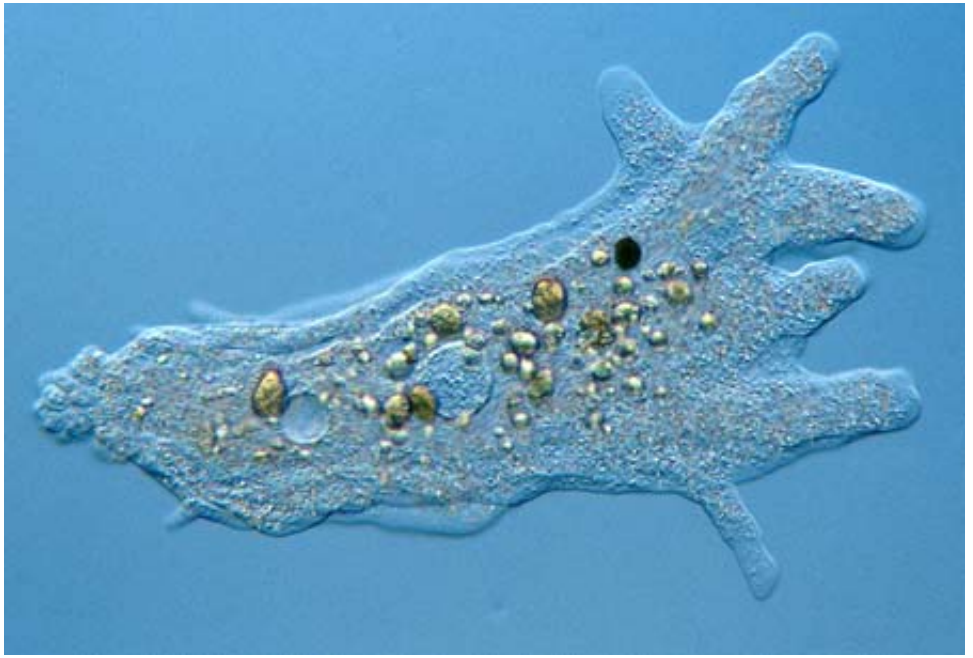
Clade: Amoebozoans

Group:Slime Molds

Group:Gymnamoebas

Group:Entamoebas

Most are Free-living Amoebas



Supergroup: Unikonta

Clade: Amoebozoans

Group:Slime Molds

Group:Gymnamoebas

Group:Entamoebas

Most are parastic amoebas

Entamoeba histolytica 3rd eukaryotic after Malaria and Schistosomiasis

Supergroup: Unikonta

Clade: Opisthokonts

Group:Nucleariids

Group:Choanoflagellates

Very Diverse Group:

Nucleariids = most closely related to Fungi

Choanoflagellates = most closely related to animals

Supergroup: Unikonta

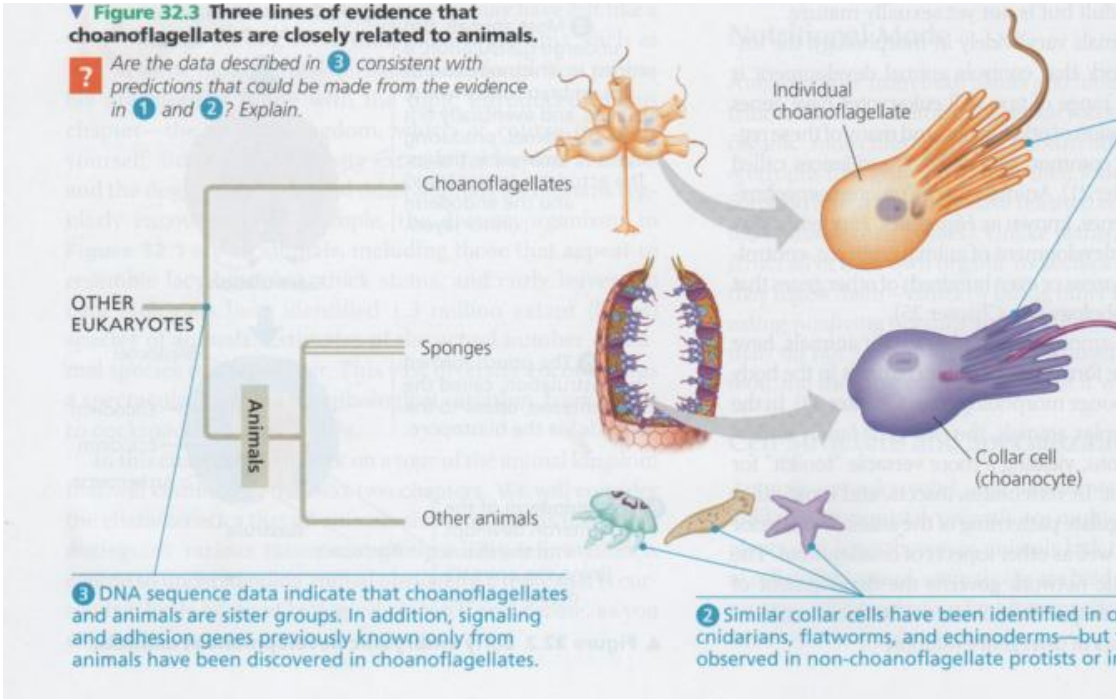
Clade: Opisthokonts

Group:Nucleariids

- Amoebas that feed on algae and bacteria

Supergroup: Unikonta
Clade: Opisthokonts
Group:Choanoflagellates

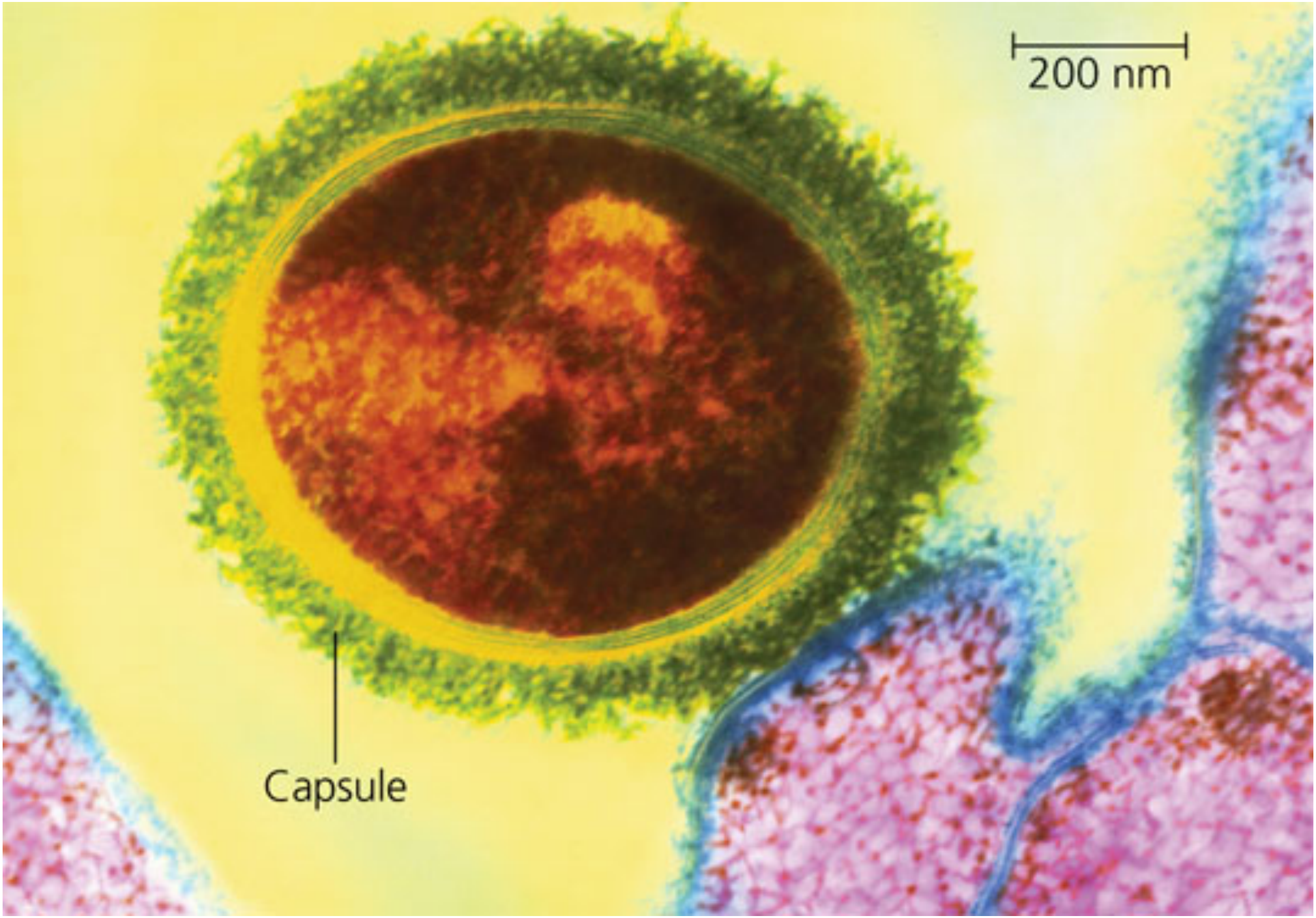
- Similar in morphology and DNA to animals



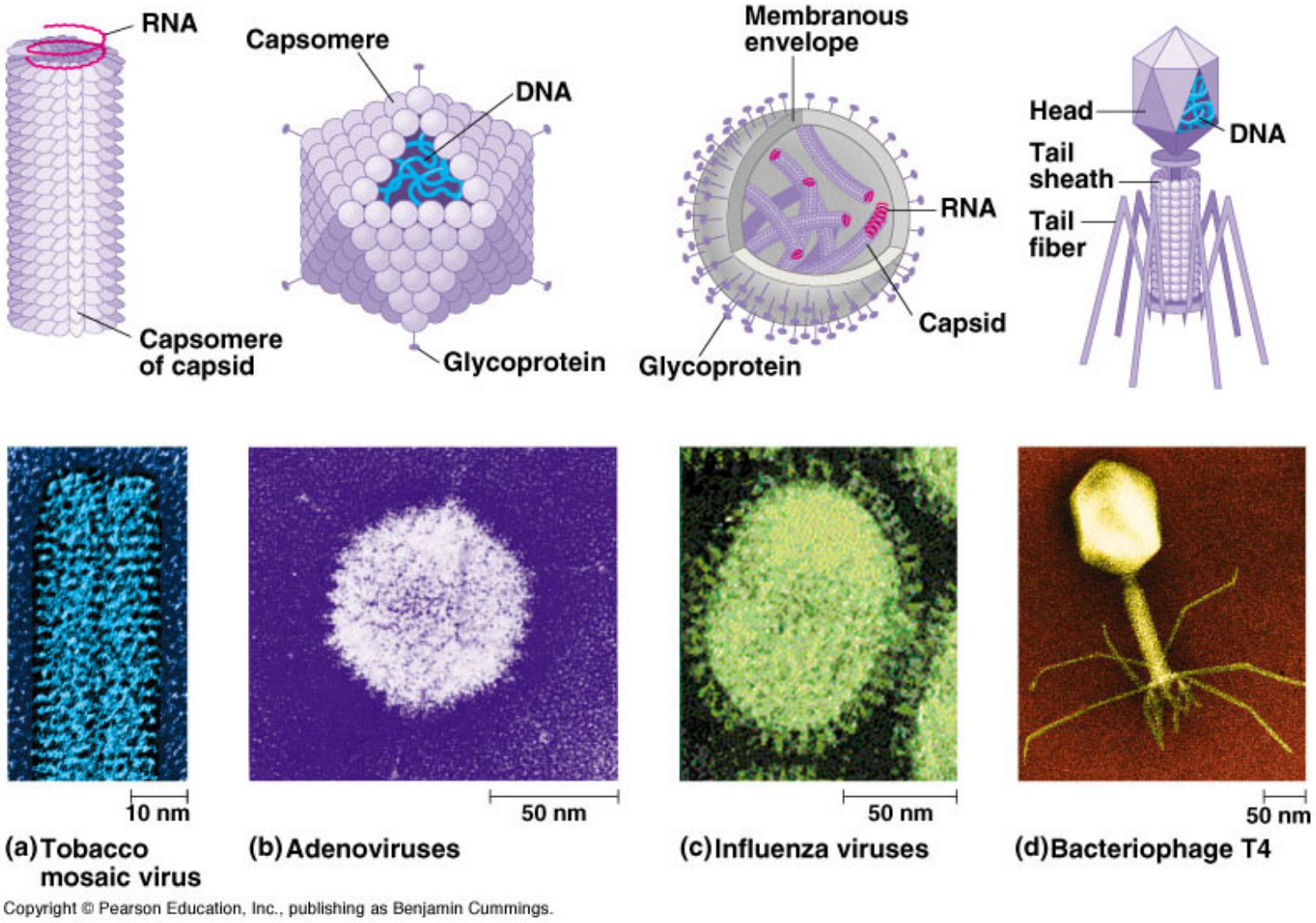
Domain: Archaea

- Group: Methanogens
  - methane releasing
- Group: Halophiles
  - lives in high salt areas
- Group: Thermophiles
  - lives in extreme temperatures

Viruses

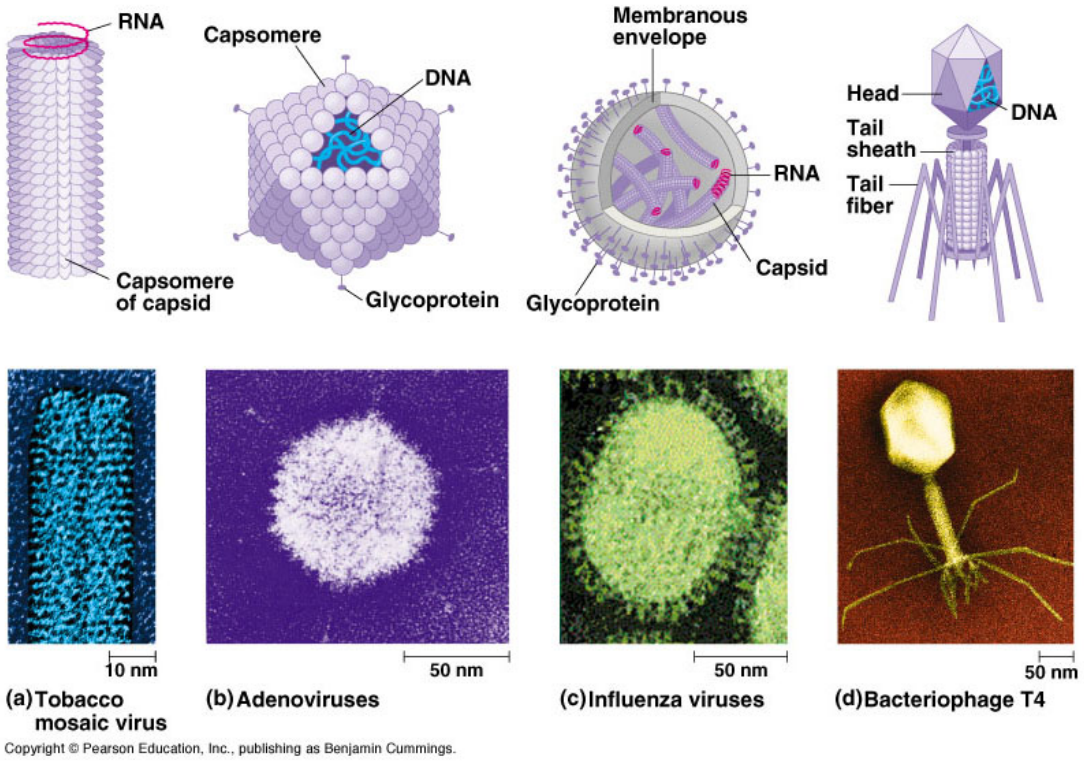

200 nm
Capsule

Virus Structure



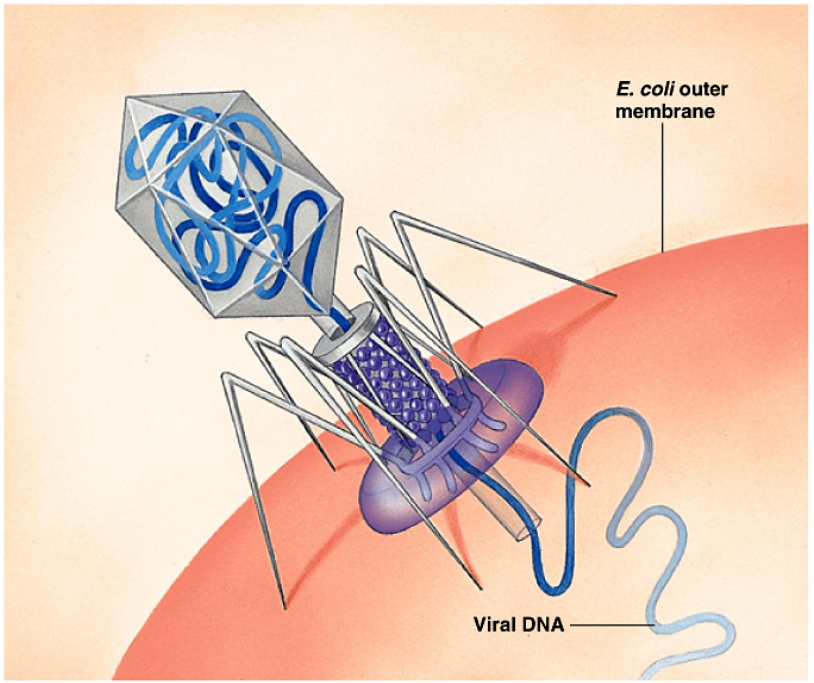
Virus Structure

- **Capsid** – Protein coat covering virus; present in all viruses. Capsids are made from protein subunits called **capsomeres**.
- _____ – Layer of fat surrounding capsid; present in some viruses but not all.



Viral Replication

- Only reproduce when they enter a host cell
- They lack ribosomes and enzymes necessary for protein synthesis and simple metabolism



Viral Genome Structure

- dsDNA
- ssDNA
- dsRNA
- ssRNA
  - Serve as mRNA
  - Serve as template for mRNA
  - Serve as template for DNA (retro)

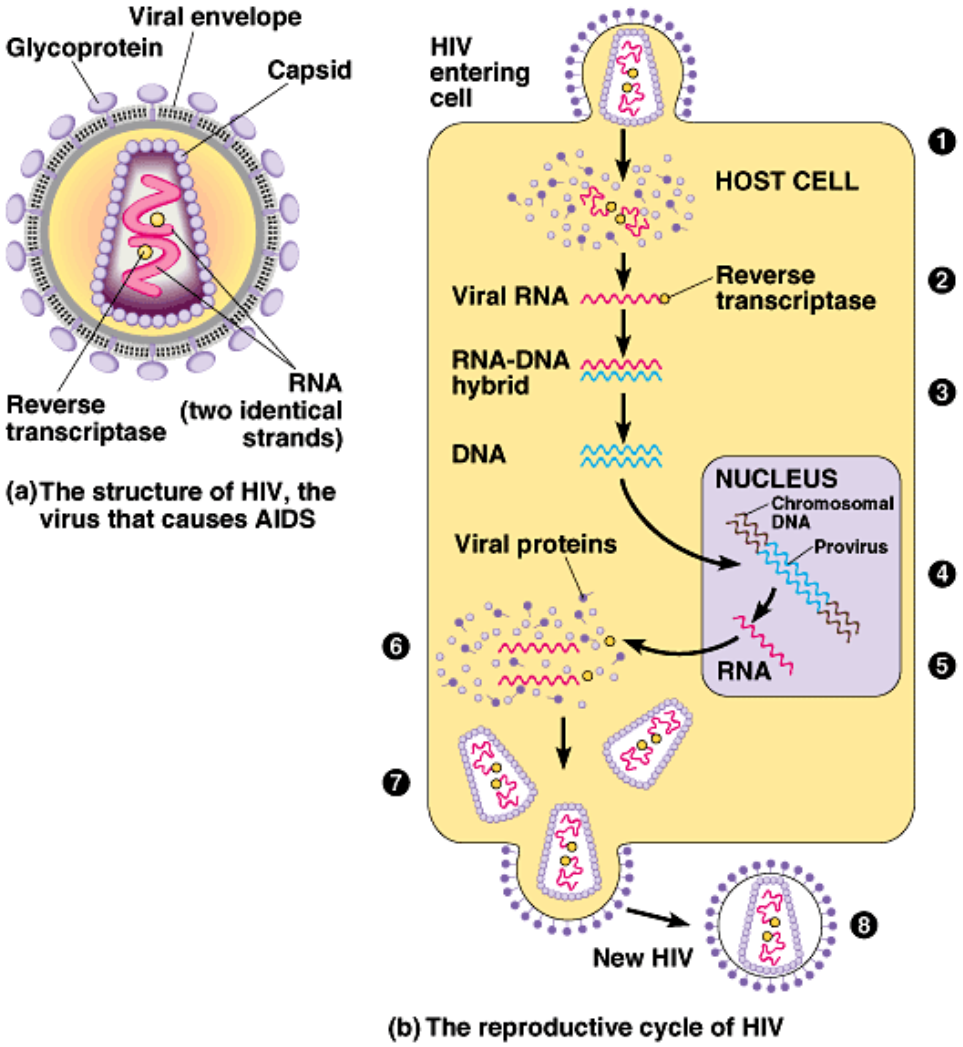
Table 18.1 Classes of Animal Viruses, Grouped by Type of Nucleic Acid

Class*	Examples/Diseases
I. dsDNA**	
Papovavirus	Papilloma (human warts, cervical cancer); polyoma (tumors in certain animals)
Adenovirus	Respiratory diseases; some cause tumors in certain animals
Herpesvirus	Herpes simplex I (cold sores), herpes simplex II (genital sores); varicella zoster (chicken pox, shingles); Epstein-Barr virus (mononucleosis, Burkitt's lymphoma)
Poxvirus	Smallpox; vaccinia, cowpox
II. ssDNA	
Parvovirus	Roseola; most parvoviruses depend on co-infection with adenoviruses for growth
III. dsRNA	
Reovirus	Diarrhea; mild respiratory diseases
IV. ssRNA that can serve as mRNA	
Picornavirus	Poliovirus; rhinovirus (common cold); enteric (intestinal) viruses
Togavirus	Rubella virus; yellow fever virus; encephalitis viruses
V. ssRNA that is a template for mRNA	
Rhabdovirus	Rabies ← Bullet shaped envelope
Paramyxovirus	Measles; mumps
Orthomyxovirus	Influenza viruses
VI. ssRNA that is a template for DNA synthesis	
Retrovirus	RNA tumor viruses (e.g., leukemia viruses); HIV (AIDS virus)

*The subclasses within each class differ mainly in capsid structure and in the presence or absence of a membranous envelope.
**ds = double-stranded; ss = single-stranded.

HIV (a retrovirus)

- Viruses that causes AIDS
- Peters Duesberg



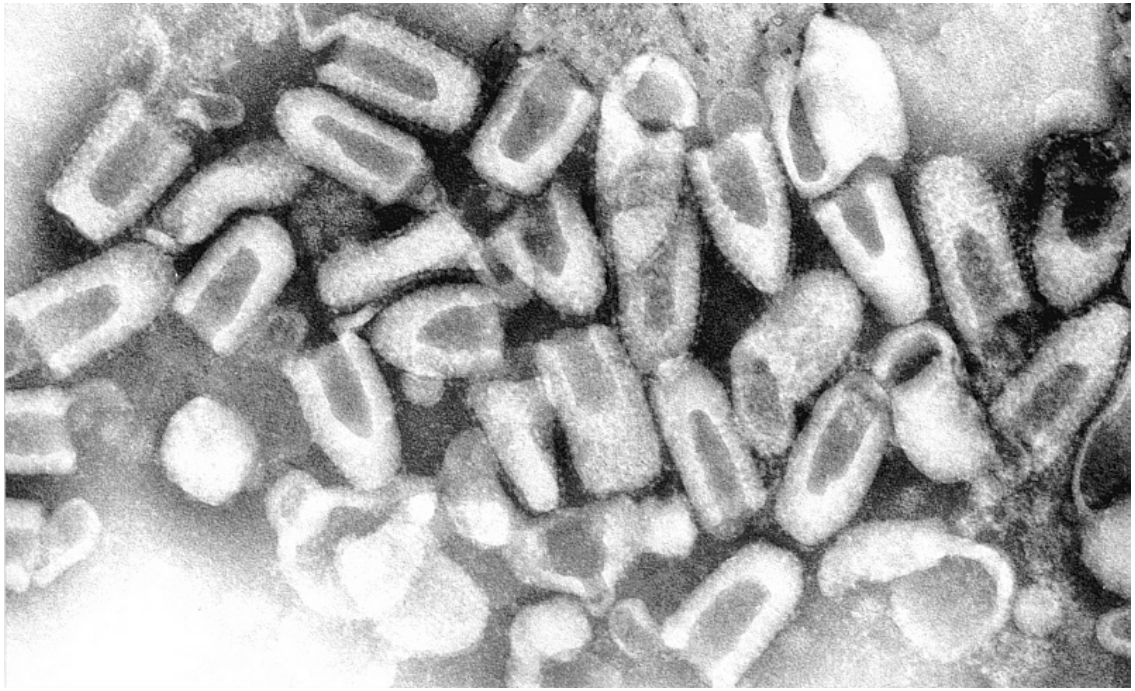
- ss RNA that can serve as mRNA
- Can cause paralysis in motor neurons
- Transmitted through fecal contaminated food/water
- Worse in *intermediately* clean cities
- Salk vaccine, _____

Hepatitis

- Inflammation of the liver
- At least 5 different types of the virus
- **Hep A** – ss RNA, no envelope; fecal-oral
- **Hep C** – ss RNA with envelope; sexually transmitted/ blood

Rabies Virus

- Bullet Shaped Envelope (ss RNA)
- Long incubation period
- Almost always fatal if unvaccinated.
- Werewolves, Vampires
- Zoonosis
- Host Range



Flu

- **Influenza, commonly known as the flu**
- **Symptoms include fever, sore throat, myalgia, coughing, weakness**
- **Many Epidemic/**
- **Pandemic**

Episodes (1918-1919) 20-100 million died; Spanish Flu

Prions

- Infectious Protein Particles
- Examples:
- **Mad Cow Disease**
- **Creutzfeldt-Jakob Disease**
- **Kuru** (Fore tribe of Papua New Guinea)
- Fatal Familial Insomnia (you don't have it!)