

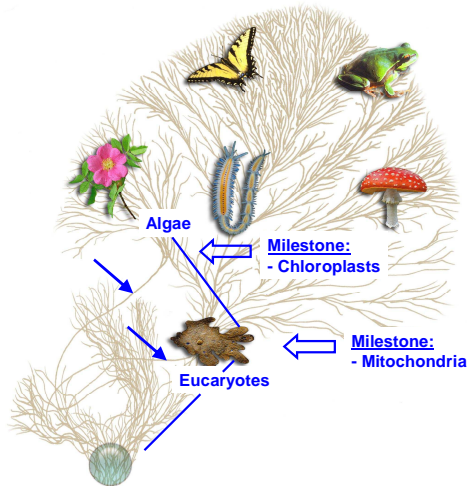
Evolution I

Early Plants

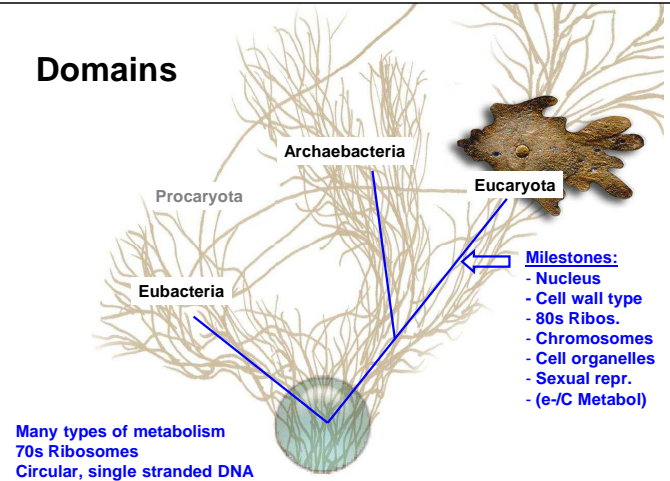
March 7, 2008

Evolution basics: Self study

- **Definitions:** *Evolution, Microevolution, Macroevolution*
- **Vocabulary:** *Natural Selection, Mutation, Migration, Genetic Drift, Isolation, Speciation*
- **Study questions:**
 - Define *evolution*
 - What is the difference between *microevolution* and *macroevolution*?
 - Describe how *microevolution* works.
 - Name 4 forces that drive microevolution.
 - Describe how *macroevolution* works.
 - Describe the process of speciation.
 - Name and describe 4 isolation mechanisms



Domains

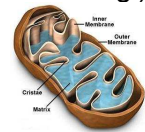
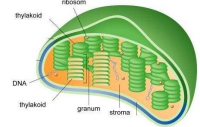


Endosymbiont hypothesis



Symbiogenesis

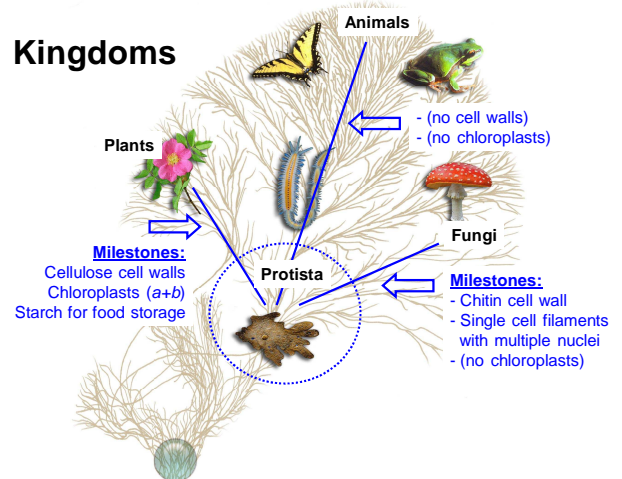
- **Chloroplasts** in Protista originate from endosymbiotic cyanobacteria.
- **Mitochondria** (also in animals and fungi) originated in the same way.



Endosymbiont "Theory"

- Same size as bacteria
- Double membrane (ingested bacteria)
- DNA code like bacteria
- Bacterial ribosomes
- Circular DNA like bacteria
- Reproduce like bacteria

Kingdoms



Protista with chloroplasts = Algae

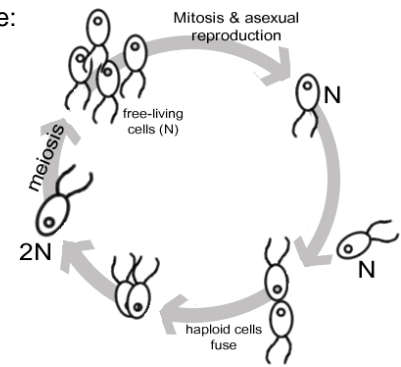
Taxonomic level: **Phyla**

- Red Algae
- Brown Algae
- Green Algae
- Dinoflagellates
- Diatoms
- (Other classes)

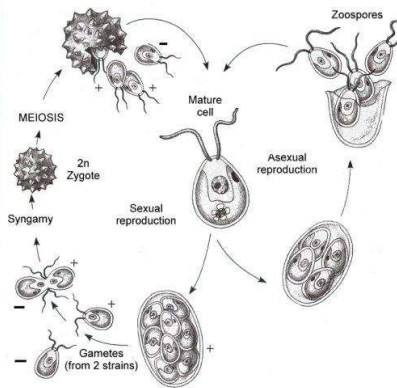
Differ in storage & Photosynthetic pigments
(Green Algae: Starch & Chlorophyll b)

Speaking of reproduction ...

Simplest case:



For example: Clamydomonas



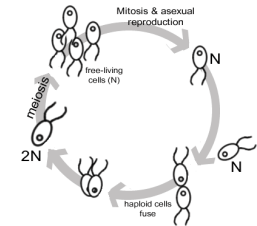
Recurring Vocabulary

- Zygote
- Gametes
- Meiosis (M!)
- Fertilization (F!)
- Haploid
- Diploid

Optional and difficult self study questions

- What's the advantage of sexual reproduction?
- What is the best time for sexual reproduction?
- What is the advantage of male and female gametes?
- How would you modify the lifecycle below to create a multicellular algae (alga 1N or 2N)

We'll discuss this next week ...



Early plant evolution: what you should know

- **Taxa, milestones, and trivia:** Domains: *Archaeobacteria, Eubacteria, Eucaryota*, Kingdoms: *Protista, Plants, Animals, Fungi*, Phyla: *Brown Algae, Green Alge, Red Algae, Dinoflagellates, Diatoms*
- **Vocabulary:** Zygote, Gamete, Meiosis, Haploid, Diploid, Symbiosis, Endosymbiosis, Symbiogenesis
- **Concepts:** Symbiogenesis, Principle of a life cycle

Review Questions

- Draw an evolutionary tree for domains and kingdoms
- What distinguishes *Archaeobacteria* and *Eubacteria* (list up to three milestones)?
- What distinguishes *Eucaryotes* from *Procaroyotes* (*Archaeobacteria* and *Eubacteria*)?
- What is the most important role of *Eubacteria* in terrestrial ecosystems?
- How did mitochondria and chloroplasts develop? What is the technical term for this development?
- Give two examples of endosymbiosis that can be seen as an equivalent to symbiogenesis.
- What are the arguments in favor of the endosymbiont theory?
- Name 3 Domains, 4 Kingdoms, and 5 Phyla of the plant kingdom
- What distinguishes plants from animals? What distinguishes plants from fungi?

Review Questions

- What are the two major traits that are used to distinguish the phyla of the plant kingdom (e.g. red algae, brown algae, ... etc)?
- Name a type of brown algae that you probably eat every day.
- What is "agar" used for and what algae produces it (name phylum)?
- What algae is responsible for "red tides" (name phylum)?
- What phylum is most closely related to land plants? What do these algae have in common with land plants? Is this phylum a monophyletic group?
- What algae are responsible for building limestone (name phylum)?
- Describe or draw an annotated diagram of the most basic life cycle (using the vocabulary: Zygote, Gamete, Mitosis, Meiosis, Haploid, Diploid, Fertilization). Give an example of a species or name a phylum where this life cycle can be found.

Optional exercise: tree of life construction

Knowledge not required in final exam

Domains

- Archaeobacteria
- Eubacteria
- Eucaryota

Kingdoms

- Animals
- Plants
- Fungi
- Protista

Phyla

- Red Algae
- Green Algae
- Brown Algae
- Bacteria
- Cyanobacteria

Milestones

- Photosynthesis
- O₂ Atmosphere
- Symbiogenesis
- Chloroplasts
- Mitochondria
- Sexual reproduction
- Males and females
- Multicellular organisms
- More if you can ...

