Theory of Endosymbiosis

1. Endoplasmic reticulum and nuclear origins

Ancestral Prokaryote

- How nuclear envelope evolved with the ER that eventually lead to the endomembrane system.

- The folding of the membrane reached nucleus and surrounded it to create the ER

2. Presence of Mitochondria and Chloroplasts

Ancestral Heterotrophich Eukaryote

- Small cell gets eaten by big cell

- All eukaryotic cells have mitochonria but not all have chloroplasts

Ancestral Photosynthetic Eukaryote

Evidence:
- Inner membranes are similar to plasma membranes of prokaryotes
- Division is similar in these organelles and some prokaryotes
- DNA structure is similar to that of prokaryotes
- These organelles transcribe and translate their own DNA

Placid --> Cells like chloroplasts

Multicellular Organization

Bodies consists of hyphae: maximize surface area, aid in absorbtion

Not all fungi have the above ground structure

Fungi made up of whitish thin strands to maximize surface area

Absorption

Feed in a way no other organism does

Grow through the food they are going to eat and break down the organic molecules and then gets absorbed

--When that happens water follows by osmosis

Advantages of Cells

Multicellular Organization (cont)

Water builds pressure which takes the nutrients to the tips of the cells which leads to fast growth

Made of nutrition: Don't use CO_2. Have to use organic molecules for carbon and energy

Incomplete septum between cells allows for rapid growth

Fungal cell walls include chitin - allows for structural stability

Hyphae organize into mycelium

Mycelium can be formed for the hyphae from a single organism or from multiple organism

Largest organism is a fungi

Special Points

Protists kingdom no longer exists because they dont have all decendants in common. *not all protists are related to each other*

Protists are not monophyletic

Prokaryote Fossil Record Changes

1st record dates back 1.8bya (fossils)

- Before fossils there was chemical evidence found *(lipids)*

Mitochondrian Charts: How To

- Looks at the percent similarity of bacterial evolution

- Mitochondria from wheat was closest to the ribosomal RNA

- the # is the % of the SAME genetic variation

Fungi

Supergroups of fungi, protists, animals

Choanoflagellates and Nucleariids are both protists

- Nucleariids most closely related to fungi	- Choanoflagellates most closely related to animals

Complex multicellularity evolved

Multisimularity Origins

Some single-celled eukaryotes gave rise to multicellular forms, whose descendants include algea, plants, fungi, and animals

- Sexual reproduction evolved

Simple Multicellular Organisms Contain

- Adhesion molecules that cause adjacent cells to stick together but there is little communication or transfer of resources between cells and little differentiation of specialized cell types

- Most or all of the cells retain a full range of functions including reproduction

- Every cell is in contact with the external environment

- Complex multicellular organisms contain as many as a trillion or more cells that work in close coordination

- Complex multicellularity has evolved at least six times

Simple: colonies of bacteria. Each cell is almost exactly the same with no specialized function. Little common transfer of resources. Need to exchange with the external environment

Complexity: Independent functions working as one system developed specialization

Vocabulary

Monophyletic: a group that includes all of the descendants of a group that includes all of the descendants of a given common ancestor

Protists: still used as an informal name of the diverse group of mostly unicellular eukaryotes

Early Eukaryote Qualities vs. Prokaryotes

Early Eukaryotes were single celled for a long time

Membrane Bound Nucleus	-Separates the location where DNA replication and transcription occurs --More elaborate but less efficient - Mitochondria, chloroplasts and vesicles - All processes occur simultaneously
Cytoskeleton	- Shapes can be varied and changed - allows cells to "move" - Helped catch prey...survival
Genome got more complex	- Segmented chromosome
Larger Cell	

Endosymbiosis in Modern Cells

Two cells together are better than one alone *-amoebas and x-bacteria (protists)*

After testing in the lab, the ameba couldn't survive without the bacteria

Simbiot:one organism living inside the other where they each depend on eachother

Generalized Lifecycle of Fungi

Propagate by using spores

Asexual Reproduction	Sexual reproduction
1. Spores	1. Plasmogamy *fusion of cytoplasm*
2. Germination	2. Heterokaryotic stage
3. Mycelium	3. Karyogamy *fusion of nuclei*
	3.a. Zygote
4. Spore-producing structures	4. Meiosis
5. Spores	5. Spores
	6. Germination
	7. Mycelium
	8. Plasmogamy