

# Order

- The next larger taxon is called Order
- For example cats (*felidae*) and dogs (*Canidae*) belong to *Carnivora* (meat eater)



# Class, Phyla, Kingdom

- *Orders* are grouped into *Classes* (*Mammalia*)
- *Classes* are grouped into *Phyla* (*Chordata*)
- *Phyla* are grouped into *Kingdom* (*Animalia*)

*Kingdom*

*Phylla*

*Class*

*Order*

*Family*

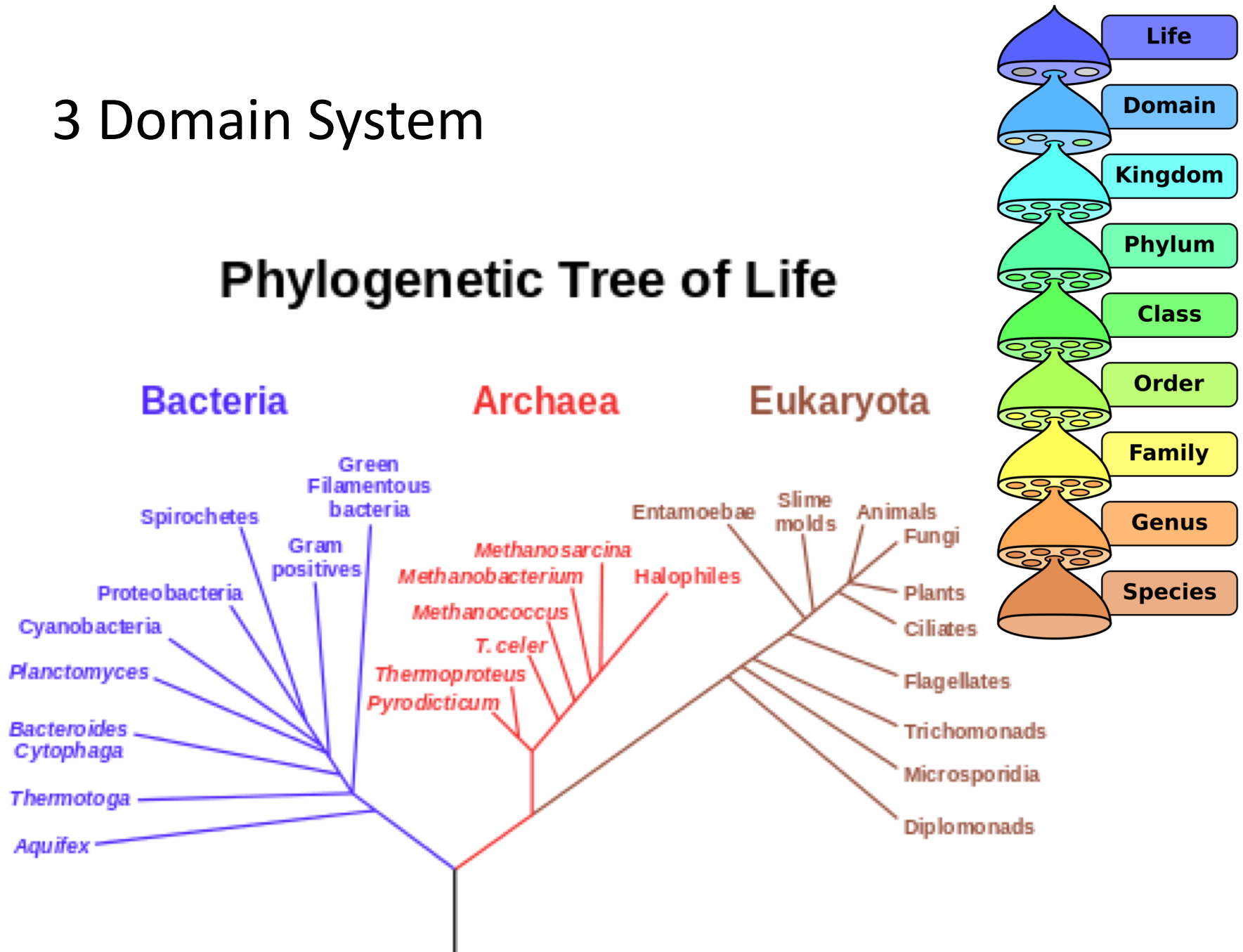
*Genus*

*Species*

(King Phillip Cuts Open Five Green Snakes)

# 3 Domain System

## Phylogenetic Tree of Life



# Five Kingdom System

- Monera



- Protista



- Fungi



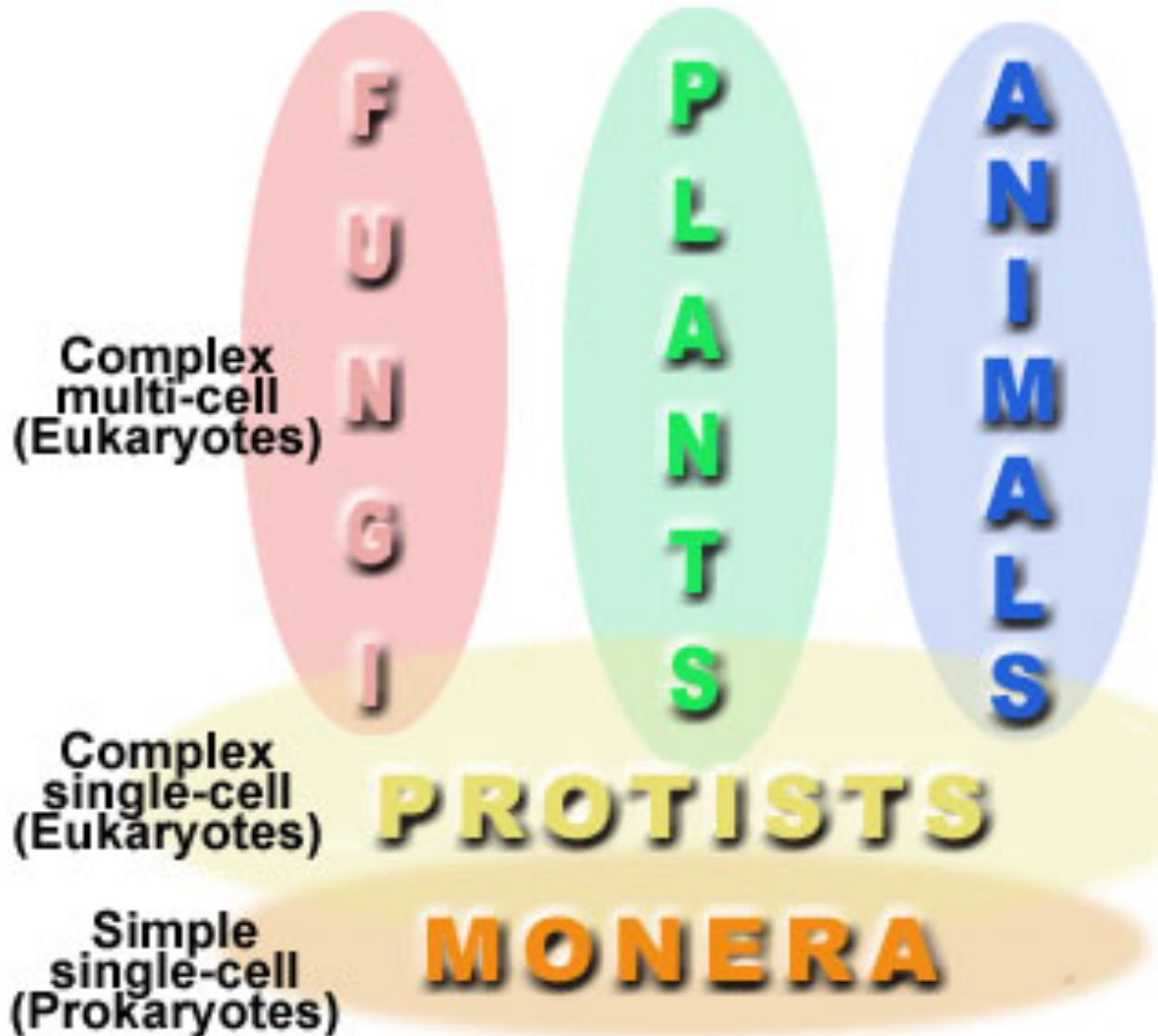
- Plantae



- Animalia

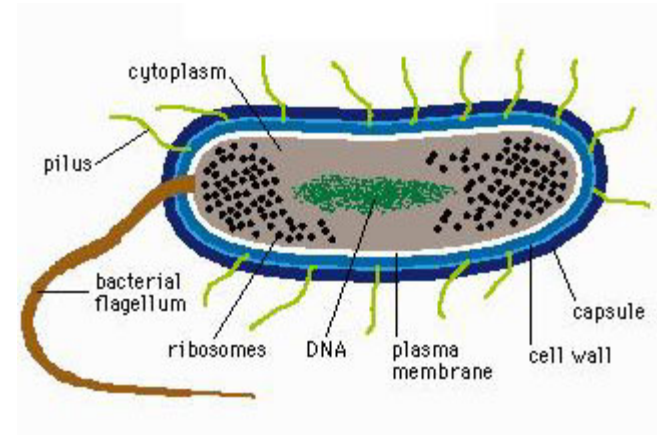


# Five Kingdoms



# Monera

- All monerans are prokaryotes
- Characteristics:
  - Lack nuclei
  - Lack mitochondria
  - Lack chloroplasts
  - Reproduce by binary fission



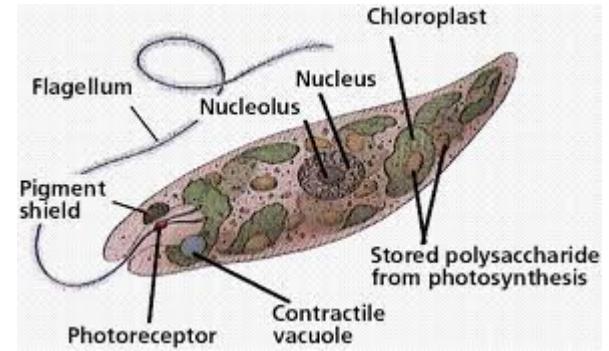
- *Escherichia coli*





# Protista

- All protists are single celled eukaryotic organisms
- Characteristics:
  - Has nucleus
  - Have organelles – which can include chloroplasts
- Kingdom Protista is divided into three groups
  - Animal-like
  - Plant-like
  - Fungi-like



- Animal – like

(unicellular, find food from the environment, move to find food source)

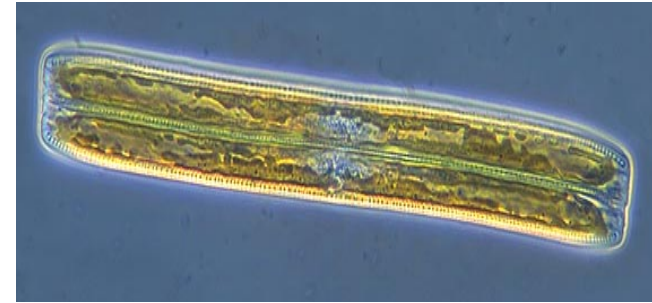
- Giardia



- Plant – like

(unicellular, make their own food (photosynthetic))

- Diatoms



- Fungi – like

(find food from the environment, reproduce by producing spores, have cell walls)

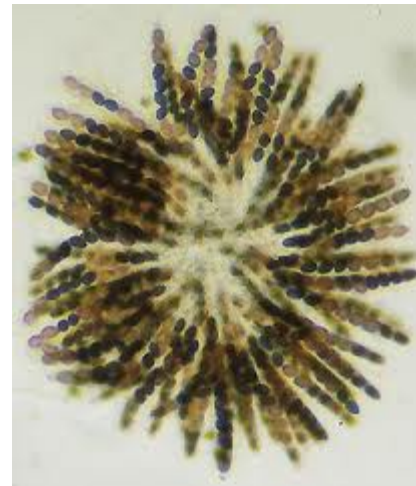
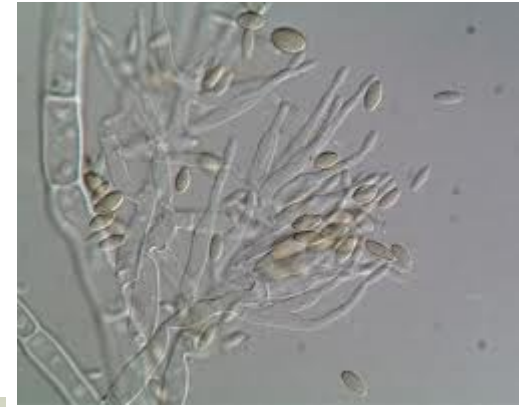
- Slime mold





# Fungi

- Have cell walls but don't contain cellulose
- Fungi are heterotrophs who do not carry out photosynthesis.
- Do not carry out photosynthesis
- Have many nuclei but not in separate cells



# Plantae

- All plants:
  - Are Multicellular
  - Have cell walls containing cellulose
  - Autotrophic: Able to carry out photosynthesis using chlorophyll



# Animalia

- All animals are:
  - Multicellular
  - Heterotrophic (can not make its own food and obtains energy from food it eats)
  - Lack cell walls

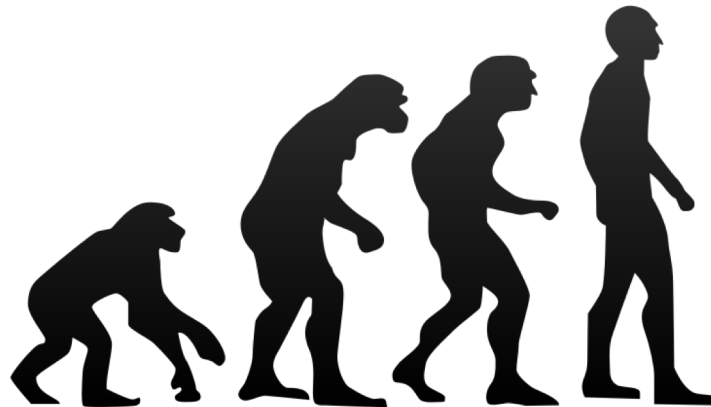


# Taxonomy Today

- Why things have changed?
  - Only the taxon species has a clear biological identity
    - Members share a common gene pool because they interbreed
  - The organisms themselves decide who belongs and who doesn't to their species
- All other taxa are “constructed” by biologists
  - They try to use biologically important characteristics, but... different biologists have different opinions
  - Some species have been moved into different taxa (and others will be in the future)

# Taxonomy and Evolutionary Relationships

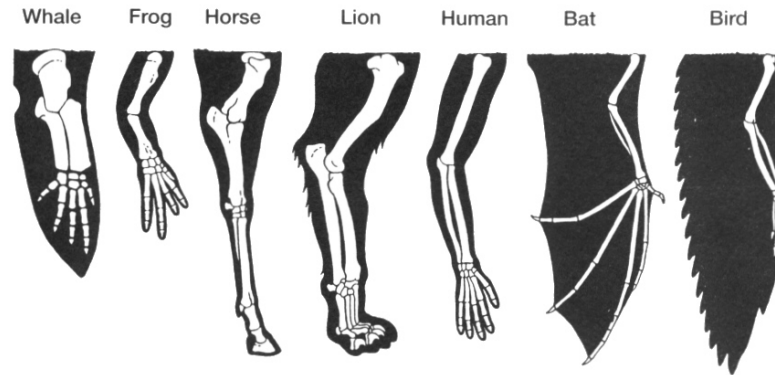
- A. Evolutionary theory states: that living species have evolved from earlier species.
- B. Thus, taxonomists group organisms in ways that show evolutionary relationships.
  - By identifying and studying homologous structures in:
    - Adult organisms
    - Developing embryos and in
    - Well preserved fossils.



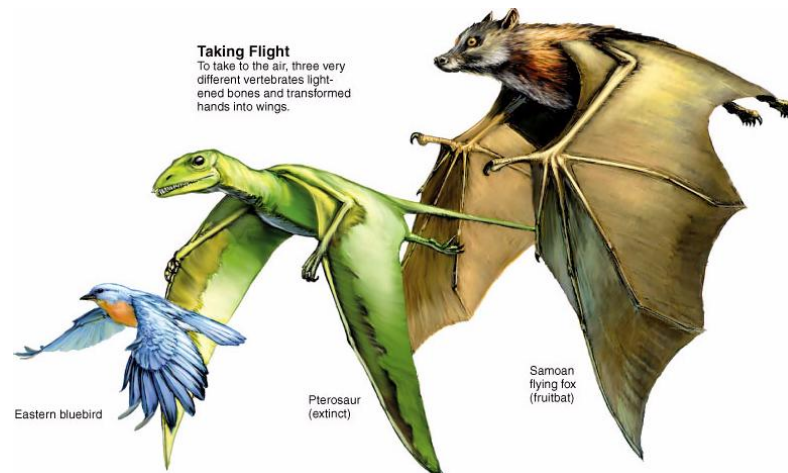
Arnold

Gorilla

C. Species with homologous structures are classified together.



D. Species with analogous structures are put in different groups.





# Biochemical Taxonomy

- **Taxonomists use molecular similarities to classify organisms**
- **Biochemical similarities**
  - All organisms (except some viruses) use DNA to carry genetic information
  - Organisms may be different but their genes and the proteins that they make are very similar
  - The sequence of the cytochrome c protein (used in the electron transport chain) is carried by all organisms, but differs slightly between species
  - These differences have been caused by mutations that occur after the ancestors of the living species diverged
- **To help us classify organisms into groups, taxonomists can compare:**
  - Nucleotide sequences in DNA and RNA
  - Amino acid sequences of proteins