Chapter 18

Classification

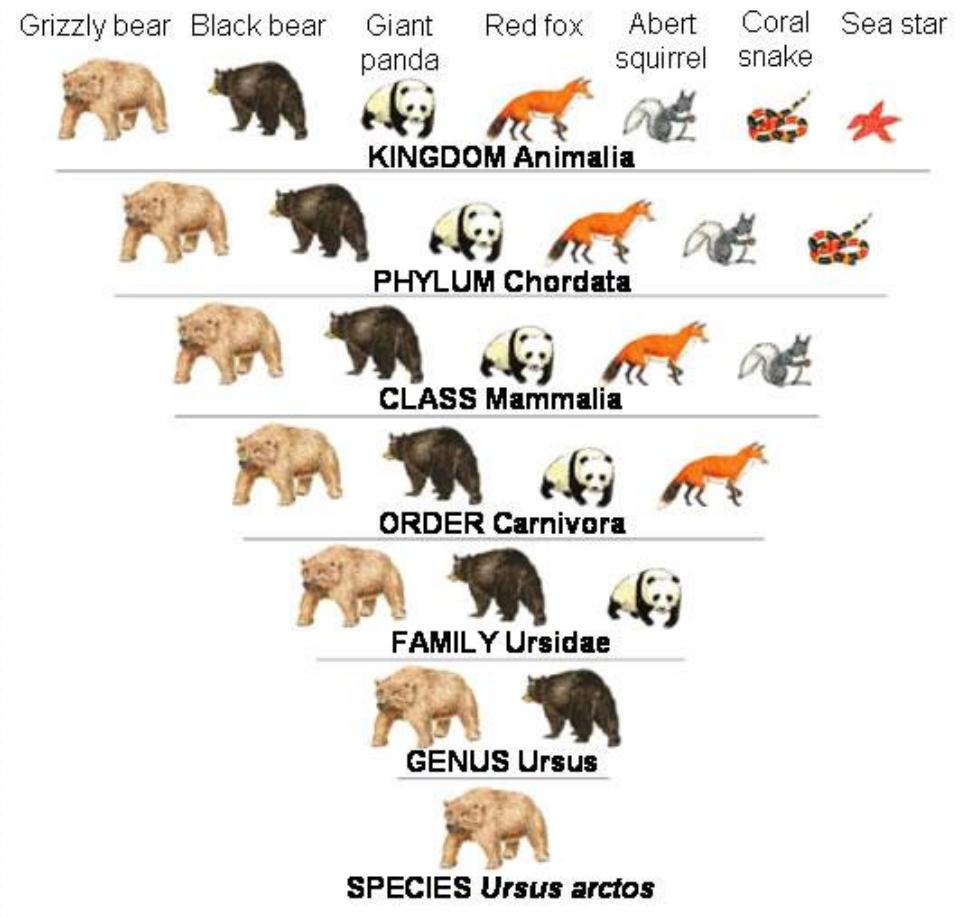
Why Classify?

- To name organisms and group them in a logical manner
- Taxonomy-a universal system to name each organism
- Binomial Nomenclature-Developed by Linnaeus; each species has a two-parted name
  - First word is capitalized
  - 2nd word is not
  - Both are italicized
  - Ex. *Homo sapien*

Linnaeus's System of Classification

- From largest to smallest, most inclusive to least
- Kingdom
- Phylum
- Class
- Order
- Family
- Genus
- Species
- Kings play chess on fine grained sand
- KPCOFGS

Linnaeus's System



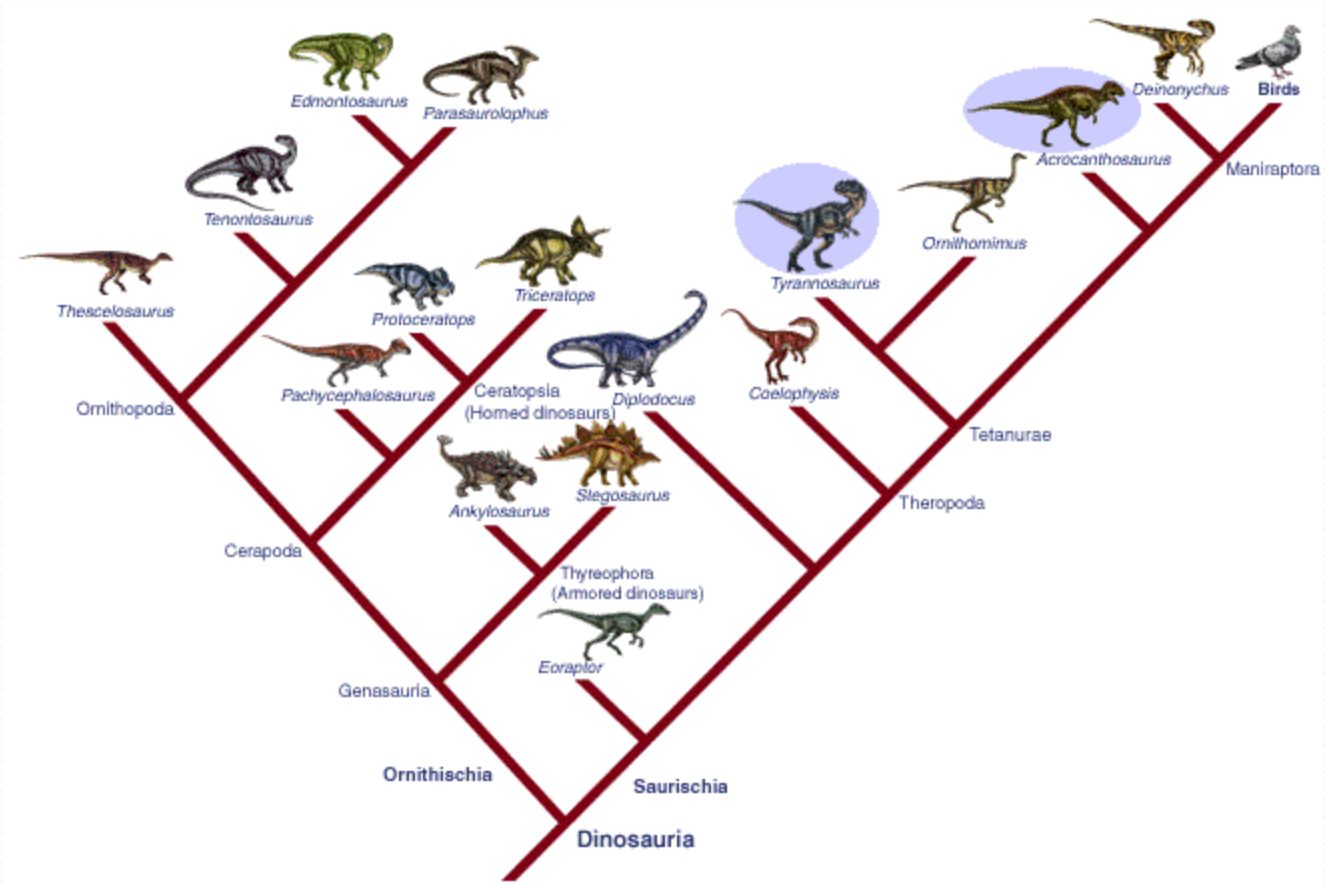
Modern Classification

- Early taxonomists relied on body structures to classify organisms
- After Darwin, we knew that animals shared traits due to common ancestors
- Now we classify organisms based on evolutionary descent, not just physical similarities

Modern Classification

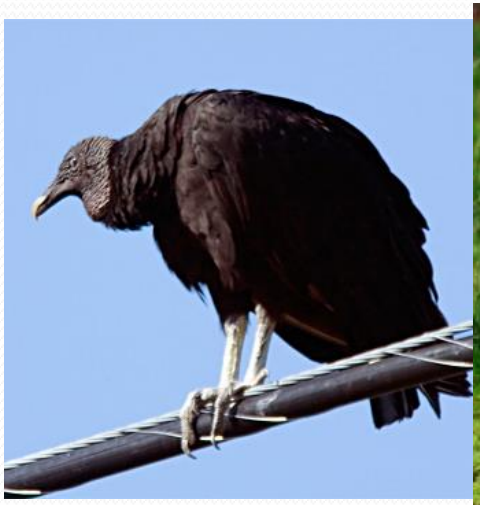
- Derived characteristics-appear in recent parts of a lineage but not its older members
- Cladogram-diagram based on derived characteristics

Cladogram


Edmontosaurus
Parasaurolophus
Deinonychus
Birds
Acrocanthosaurus
Maniraptora
Tenontosaurus
Ornithomimus
Thescelosaurus
Protoceratops
Triceratops
Tyrannosaurus
Pachycephalosaurus
Ceratopsia
(Horned dinosaurs)
Diplodocus
Coelophysis
Ornithopoda
Tetanurae
Ankylosaurus
Stegosaurus
Theropoda
Cerapoda
Thyreophora
(Armored dinosaurs)
Eoraptor
Genasauria
Ornithischia
Saurischia
Dinosauria

Similarities in DNA and RNA

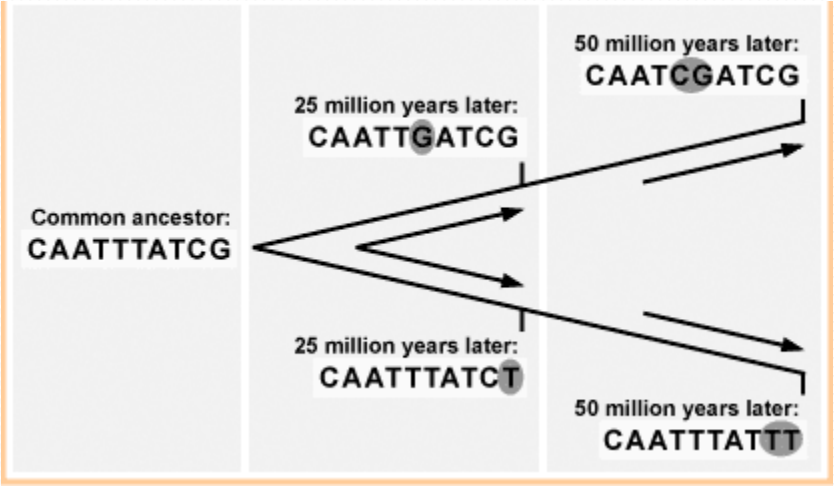
- Classification based on genetics, not just physical characteristics
- Ex.-African vultures and American vultures were both grouped into the vulture family based on physical characteristics
- Genetic analysis revealed that the American vulture is more closely related to the stork



Molecular Clocks

- Uses DNA comparisons to estimate the length of time two species have been evolving independently
- Some mutations occur that do not affect phenotype- called neutral mutations
- Neutral mutations accumulate over time, so by comparing shared and unique genes, one can estimate how long ago two species diverged from each other

Molecular Clocks

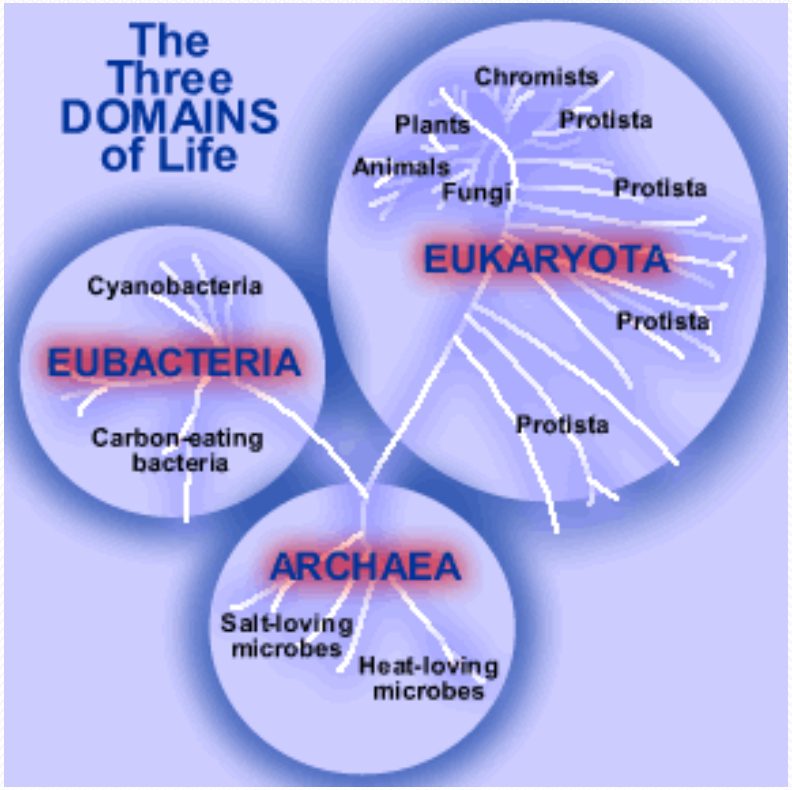


Kingdoms and Domains

- Six Kingdoms (old)-Eubacteria, Archaebacteria, Protista, Fungi, Plantae, Animalia

- Three Domain System (new)
- Bacteria (Eubacteria)
- Archaea (Archaebacteria)
- Eukarya (Plants, Animals, Fungi, Protists)
- See Figure 18-12 p. 459

Three Domain System



Bacteria

- Eubacteria-cell walls contain peptidoglycan
- Archaea-cell walls lack peptidoglycan; live in extreme environments (volcanic hot springs, brine pools)

Eukarya

- Consist of all organisms that have a nucleus
- Protista-includes anything that cannot be classified as a plant, animal or fungus
- Lot of diversity-auto- or heterotrophs, most unicellular but some multicellular (some algae)
- Fungi-heterotrophs, multicellular (mushrooms) or unicellular (yeast)

Eukarya

- Plantae- muticellular, autotrophs, non-motile
- Animalia- muticellular, heterotrophic