Linnaeus' sys based only on structural similarities
Today we consider much more

Modern Taxonomy
1-start w/struct similarities
2-consider evolutionary relationships or phylogeny
phylogeny: the evolutionary history of a species
in trying to figure out evolutionary relationships, we have to examine similar structures and ask the question - are structures similar because they are analogous or homologous?
analogous structures: struct that have same function but not evolutionarily related, diff embryological developmt
ex - insect wings & bird wings
homologous structures: struct that indicate evol. relationship, similar in embryological developmt
ex - vertebrate forelimbs p. 463
some structures are homologous only:
some structures are analogous only:
some struct both homol & anal:

Modern Taxonomy

3-comparative biochemistry

- **study of proteins, blood, hormones, enzymes to see how similar they are**
- **ex - horseshoe crab**
  - **once grouped among other crabs, but blood showed closer relationship to spiders**
  - **so we changed taxonomy**

4-comparative embryology

- **study of cell division & developmt fr. 1 cell---->embryo**
  - **certain changes occur at certain stages**
- **ex - starfish (invertebrate) more closely related to vertebrates**
  - **in developmt than other invert.**
  - **so changed taxonomy**

5-genetics

- **# and kinds of chromosomes**

6- molecular analysis of DNA

comparison of DNA of different species

African vulture vs. American vulture

very close structural similarities

but there is a behavior diff, when Amer vulture gets overheated, it urinates on legs to cool off, Afr vultures don't do this, but storks do

upon analysis of DNA, there is closer similarity btw Amer vulture & stork, so moved taxonomy

Cladograms

- a classification scheme that links groups of organisms
  - by showing how they branch off from common ancesters
- this type of scheme shows evolutionary relatedness
- many scientists today think this is more useful than the
  - Linnaean hierarchial system
- clades work by grouping species into larger categories
  - that show lines of descent instead of overall
  - similarities & differences

Taxonomy is Dynamic
History of Taxonomy
1700's Linnaeus 2 kingdoms: Plants & Animals

1800's 3 kingdoms: Plants, Animals, Microscopic Org
What did we develop that allowed us to include microscopic organisms?
1900's 4 kingdoms: Plants, Animals, Fungi, and Microscopic organisms
Where were the fungi? Why did we separate them?
1960's 5 kingdoms: Plantae, Animalia, Fungi, Monera & Protista
Now, 2 kingdoms of microscopic organisms. Why?
Kingdoms Monera & Protista
both microscopic organisms
better microscopes allowed us to see inside
fundamental diff btw them: Monera have no nucleus in cells
Protistans have a nucleus in cells

1990s: biochemical analysis showed 2 different bacterial groups

so now 6 kingdoms: Eubacteria, Archaebacteria, Protista, Fungi, Plantae, & Animalia

1990s: taxonomists established a category above kingdoms, based on genetics & biochemistry

3 domains: Bacteria, includes Kingdom Eubacteria

Archaea, includes Kingdom Archaebacteria

Eukarya, includes K. Protista, Fungi, Plantae & Animalia

Terms

prokaryotic: pro-before karyote-nut
cells with no nucleus
have genetic material (DNA) free in cell

eukaryotic: eu-true karyote-nut
cells with true nucleus, genetic material contained inside

unicellular: organism made of single cell

multicellular: organism made of more than one cell

colonial: some unicellular organisms form colonies, hard to tell from multicellular

autotrophic: auto-self troph-feeding level
self-feeder, cells that can make food w/in body

heterotrophic: hetero-other
must eat other organisms for food

asexual: organism clones itself

sexual: organism must mate with another for reproduction