

Speciation

- Steps to getting a new species :
 - Founding mothers and fathers
 - Separation of populations
 - Mutations/adaptations
 - Reproductive isolation
 - Sharing the same space :
 - Can they survive together because they now occupy different niches
- **Reproductive isolation**
 - This is the most important factor in speciation
 - Two populations *must* be isolated to prevent mixing their gene pools so that adaptations made in one population can't be transferred to the other
 - There are several ways reproductive isolation can occur
 - Geography
 - Courtship behavior (mating)
 - Fertile periods (mating)
- Divergent evolution
 - One species gives rise to many
 - Also called **adaptive radiation**
 - Two or more populations of one species must become reproductively isolated, and then go through adaptation and/or **genetic drift**
- Convergent evolution
 - Adaptations in different species may produce species with **analogous structures** to serve the same purpose
 - Ex. Wings are analogous structures in birds, insects and bats.
- **Genetic drift**
 - Random changes in the gene pool of a small population
 - Occurs when the number of individuals in the population is so small that genetic variation is decreased.

- **Genetic bottlenecks** (massive reduction in number of individuals) cause genetic drift.

Ex. Cheetah

- Genetic variation is necessary to create new species

Taxonomy

- There are over 10 million kinds of organisms
- There are hundreds of languages and dialects
 - **A good biological classification system does two things -- it assigns a universally accepted name (crossing the language barrier) and it shows evolutionary relationships by organizing organisms into groups with biological meaning**
- By the 18th century, scientists were already starting to use Greek and Latin names for organisms. These *scientific names* were highly descriptive and cumbersome
- *Carolus Linnaeus*, from Sweden, developed a less confusing system of *binomial nomenclature*, where every organism gets a two-part name.
- The first part of the name is the *genus* and the second part is the *species*. Organisms that are closely related will have the same genus name, but different species names.

- *Hyla versicolor* and *Hyla septentrionalis* are both treefrogs, but they are different species
- Linnaeus then developed a taxonomy system based on structural characteristics
 - **Taxonomist are currently revamping this system, basing it on molecular data and genetic relationships**
- There are **7 taxa** (groupings) in the Linnaen system. From largest (most general) to smallest (most specific),

Kingdom, Phylum, Class, Order, Family, Genus, Species

- Originally, there were only 2 kingdoms. Now there are 5
- The *only* taxon with a clear biological identity is the species. All other taxa are groupings of related organisms (many species)
- Species most closely related (shown through molecular studies) are grouped in the same genus and/or family
- Why do we have five kingdoms now? Because of increased knowledge

Five Kingdoms

Prokaryotae (single-celled bacteria)

Protista (algae, slime molds)

Fungi (mushrooms, molds, yeast)

Plantae (multicellular organisms that carry of photosynthesis,-Plants)

Animalia (multicellular organisms that eat other organisms for nourishment)

Six kingdoms? Maybe, soon, Bacteria will be split into Archaeobacteria and "modern" bacteria