

How Biological Diversity Evolves

- Microevolution and Macroevolution
 - Microevolution
 - Changes in allele frequencies within populations
 - Often associated with adaptation
 - Can be measured from one generation to the next
 - Macroevolution
 - Major changes in the history of life
 - Origin of new species
 - Generates biological diversity
- Biological Species Concept
 - A population or group of populations whose members have the potential to interbreed with one another in nature to produce fertile offspring, reproductively isolated from other such groups
- How do new species form?
 - The gene pools of two or more populations must be separated from one another
 - Allopatric Speciation
 - Species evolve in geographic isolation
 - Usually associated with a geographic barrier preventing members of two populations from mating with one another
 - Involves independent evolution of the populations after the barrier arises
 - Geographic barriers like deep canyons and oceans can isolate populations.
 - Grand canyon
 - Chances for allopatric speciation increase if the population is small
 - Small populations are more likely to have a restricted gene pool
 - Founder effect
 - Small populations can change more rapidly by both genetic drift and natural selection
 - Sympatric Speciation
 - Species evolve without geographic isolation --- Species remain together with potential to interbreed
 - Probably associated with a genetic barrier due to a single mutational event
 - Important in plants but not widespread among animals
 - More difficult than allopatric because it requires a subdivision of the gene pool of a single population. Keeping those subdivisions isolated requires special circumstances
 - Segregation of habitat
 - Major alterations in mate recognition or behavior
 - Genetic incompatibility
 - Accidents during cell division that lead to extra chromosome sets are one mechanism of sympatric speciation