

Chapter 24

The Origin of Species

Speciation: the origin of new species; is at the focal point of evolutionary theory

Microevolution consists of changes in allele frequency in a population over time

Macroevolution refers to broad patterns of evolutionary change above the species level

24.1 The biological species concept emphasizes reproductive isolation

- **The Biological Species Concept**

- A biological species is a group of populations whose individuals have the potential to interbreed and produce viable, fertile offspring with each other but *not* of members of another species
- The biological species concept emphasizes reproductive isolation through pre zygotic and post zygotic barriers that separate gene pools

- **Reproductive Isolation**

- The existence of biological factors (barriers) that impede two species from producing viable, fertile offspring
- **Hybrids** are the offspring of crosses between different species
- Reproductive isolation can be classified by whether factors act before or after fertilization
- **Pre zygotic barriers** block fertilization from occurring by
 - impeding different species from attempting to mate
 - preventing successful completion of mating
 - hindering fertilization if mating is successful
- **Habitat isolation:** two species encounter each other rarely, or not at all, because they occupy different habitats, even though not isolated by physical barriers
- **Temporal isolation:** species that breed at different times of the day, different seasons, or different years cannot mix their gametes
- **Behavioral isolation:** courtship rituals and other behaviors unique to a species are effective barriers
- **Mechanical isolation:** morphological differences can prevent successful mating
- **Gametic isolation:** sperm of one species may not be able to fertilize eggs of another species
- **Post zygotic barriers** prevent the hybrid zygote from developing into a viable, fertile adult
 - **reduced hybrid viability:** Genes of the different parent species may interact and impact the hybrid's development
 - **reduced hybrid fertility:** even if hybrids are vigorous, they may be sterile
 - **hybrid breakdown:** some first generation hybrids are fertile, but when they mate with another species or with either parent species, offspring of the next generation are feeble or sterile
- **Limitations of the BSC**
 - The biological species concept cannot be applied to fossils or asexual organisms (including all prokaryotes)