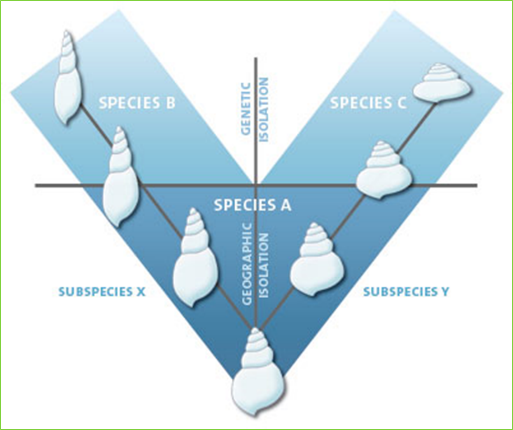
**Speciation/Mechanisms of Evolution**

* + The formation of a new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + When species are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ separated over long periods of time, new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can result
  + Population is split into two or more smaller groups by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ barrier
    - ****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, streams, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, desert, etc.

**Geographic separation**

**Reproductive isolation**

* Over time, geographically separated species evolve separately and become \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ isolated
* Reproductive isolation:
  + Members of a species \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mate and/or produce viable offspring
  + When reproductive isolation occurs:

🡪\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ species!

* **Many reproductive isolating mechanisms:**

**Reproductive Isolating mechanisms**

1. Temporal
   * Species have different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, periods of fertility, or periods of activity (morning vs. night)
2. Ecological
   * Species only mate in their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which is not shared by a different species
3. Behavioral
   * Species have different mating \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (calls, [dances](http://www.youtube.com/watch?v=7dx2CUMtZ-0), etc.)
4. Mechanical
   * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ differences prevent mating

5. Post-mating Mechanisms

* + Mating takes place, but:
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ does not occur (gametic isolation),
    - Zygote or embryo \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (hybrid inviability),
    - Or, offspring is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (hybrid sterility)
  + Examples:
    - Mule:
      * Sterile hybrid of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Liger:
      * Sterile hybrid of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Two hypotheses about how evolution occurs:**

* + Gradualism
    - Genetic changes are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ but steadily occurring
    - Over time, small changes add up to the formation of a new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Punctuated Equilibrium
    - Periods of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_ change, followed by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change
    - Mutation occurs that causes a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number of individuals
      * If the change is advantageous , these individuals will have high fitness and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the trait along

**Natural Selection**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = any trait that aids the chances of survival and reproduction of an organism.
* Examples:
* Two Types of Adaptations : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + STRUCTURAL ADAPTATIONS arise over \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Types of Structural adaptations:
    - **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** = provides protection for an organism by enabling it to copy the appearance of another dangerous species.
      * Examples:
    - **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** = enables an organism top blend in with its surroundings
      * More likely to escape predators and survive to reproduce
      * Examples
  + PHYSIOLOGICAL ADAPTATIONS can **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    - Changes in an organism’s **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    - Ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – was discovered 50 years ago as a wonder drug because it could kill many types of disease-causing bacteria
    - Now penicillin is not as effective as it used to be because many species of bacteria have evolved physiological adaptations that make them resistant to penicillin.
    - Ex: insects/ weeds have been selected for physiological resistance to chemicals used in pesticides

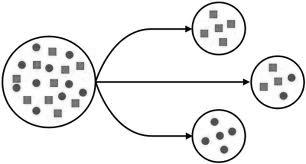
**Mechanisms of Evolution**

1. Natural \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Survival of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Mutation
   1. Changes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ frequency of populations
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ drift
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-

**Genetic Drift**

* Definition
  + Change in allele frequency of a population due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ populations are more susceptible
* In a population, some individuals will produce \_\_\_\_\_\_\_\_\_ offspring, and pass on more of their genes
* Result:
  + Over time, only one allele for a trait may \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a population (Fixation)
    - Reduce in genetic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

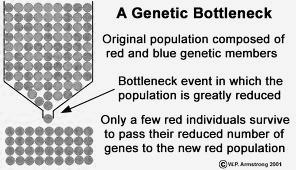
**Migration**

* Definition:
  + Movement of individuals from \_\_\_\_\_\_\_\_\_\_\_ population to a \_\_\_\_\_\_\_ population
* Movement of individuals between populations can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ allele frequency
* Founder effect
  + A colony is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by members of an existing population
  + Small colony population may have:
    - Lower genetic \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ collection of genes from the original population

**Founder Effect in the Amish**

* Live in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, PA
* Founded by 200 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ immigrants
* These immigrants had a high proportion of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ alleles that cause \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ syndrome
  + Symptoms:
* Closed gene pool keeps the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ alleles in the population

**Population Bottleneck**

* Definition:
  + A populations size is greatly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for at least one generation
  + Genetic diversity is greatly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + If population increases again, the genetic diversity will be extremely \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Bottleneck Examples**

* Elephant seals
  + Almost hunted to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the 1890s
  + Population dwindled to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ seals
  + Once the species was protected, it was able to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Today, population is 30,000
* Cheetahs
  + Near extinction \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ years ago
    - End of last \_\_\_\_\_\_\_\_\_\_ age
  + Population further \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ due to poaching
  + Today, all cheetahs have almost identical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Reduced \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_