**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:**
	1.
	2.
	3.
	4.
	5.

**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 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_