Allopatric and Sympatric Speciation
Allopatric Speciation

- Occurs when a species is separated by a geographical divide and evolve into unique species because of their genetic isolation.

- They adapt over time to their new environment and lose the ability to reproduce if placed back together again.

- Is related to the founder effect, genetic drift, and natural selection (adaptive radiation).

- It is believed the primary form of speciation.
Example 1: Grand Canyon
Example 2: Desert Pupfish
6 x 18 x 2 feet is the world smallest known habitat for an endemic species

Devil’s Hole Pupfish
The entire world’s population of this species lives above 11,000 feet on “The Peaks”
Example 4: Canary Islands

[Map showing the Canary Islands with a focus on Tenerife]
Island of Tenerife
Teide Volcano (largest in the world outside of Hawaii)
There are 12 species of lizards endemic to the Canary Islands.
Giant Tenerife Lizard (Gallotia galloti)
Giant Stonecrops of the Canaries
Sympatric Speciation

• Speciation that occurs when two species have ranges that overlap
• Much rarer
• Must occur when there are other forms of isolation including;
  – Temporal (active at different times of day)
  – Behavioral (different lifestyle choices)
  – Disruption (due to new resources and divergent selection)
Disruption

• Apple maggots originally fed on native hawthorn trees
• When closely related apple trees were brought from Europe and began to be grown on a large scale, these flies also began feeding on them as well.
• Now that population has begun to specialize on apples and diverged from the populations that still eat hawthorn fruit.
Behavioral Divergence
Resident vs. Transient Orcas

- Resident orcas live in large close knit family pods within relatively small defined ranges.
- Transient orcas travel long distances in small pods.
- Residents and Transients do not interbreed, interact, or even speak the same “dialect”.

![Image of an orca jumping out of the water]

Even Different Foods

- Resident orcas feed almost exclusively on salmon.
- Transient orcas feed exclusively on marine mammals such as seals and porpoises.
Temporal Isolation

• The ranges of the eastern spotted skunk and western spotted skunk overlap.

• Although they are genetically similar enough to interbreed, they do not. Why?
Temporal Isolation

Western Spotted Skunk
• breeds in late summer

Eastern Spotted Skunk
• breeds in late winter
Breeding Season

• Since available reproductive periods are very limiting, if they do not come into estrus at the same time, they cannot share genes.

• These toads never mate in the wild, but they have been successfully bred in the laboratory.

American Toads breed in late summer  Fowler’s Toad breeds in early summer