

Speciation

# Who's your daddy/mommy?

## Liger

(tiger and lion)



## Zebroids

(zebra & horse or donkey)

## Grolars

(grizzly & polar bear)



## Wholphins

(female bottlenose dolphin & a male false killer whale)

# Speciation

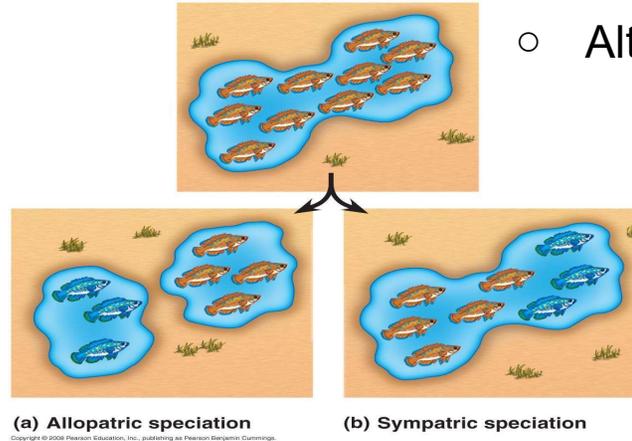
- Formation of new species from existing specie
- Also called macroevolution
- When members of a sexually reproducing population change so much that they are not able to produce, viable, fertile, offspring with members of the original population, speciation has occurred
- Two main mechanisms:
  - Allopatric speciation
  - Sympatric speciation

## Allopatric Speciation

- Geographic separation
  - Genetic exchange is limited
  - Population becomes genetically different over time as a result of isolation

## Sympatric Speciation

- Populations not geographically separated
- Can be due to rapid changes that:
  - Alter morphology
  - Alter behaviour
  - Alter habitat preferences



# Causes Of Speciation Within A Population

- Speciation occurs when a barrier preventing viable fertile offspring
- Two types of mechanisms that prevent reproduction:
  - ***Prezygotic Mechanisms***
    - Before fertilization
    - Prevents mating from occurring
    - Impede mating or prevent fertilization of eggs if individual is from a different species
  - ***Postzygotic Mechanisms***
    - After fertilization

# Prezygotic Mechanisms



Water-dwelling *Thamnophis*



Terrestrial *Thamnophis*

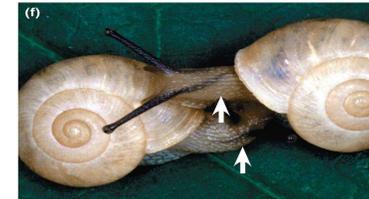


Eastern spotted skunk (*Spilogale putorius*)

- There are a number of isolating mechanisms to prevent mating:
  - **Behaviour isolating:** different behaviours such as courtship rituals, bird calls  
Ex. Blue-footed booby [video](#), [Eastern and Western Meadowlarks](#)
  - **Habitat isolating:** same geographic area, but different habitat  
Ex. water-dwelling thamnophis vs terrestrial thamnophis
  - **Temporal isolating:** breeding occurs at different times  
Ex. Different seasons, time of day  
Ex. Eastern spotted skunk (late winter) vs Western spotted skunk (late summer)
  - **Mechanical isolating:** structural differences prevent mating  
Ex. genital opening (arrows not aligned. No matting)
  - **Gametic isolating:** sperm cannot fertilize eggs  
Ex. sea urchins



Sea urchins



*Bradybaena* with shells spiraling in opposite directions

# Post Zygotic Mechanisms



- Prevents hybrid zygotes from developing into viable, fertile adults
- Examples:
  - If a sheep and a goat mate → offspring dies before birth
  - Male donkey x female horse → mule
    - Healthy, but sterile
- It is possible for the first generation of the hybrid to be viable and fertile, but second generation offspring are sterile.



## Consequences of Human Activities on Speciation

Human activities can affect the genetic diversity of populations in the following ways, by:

1. Converting large stretch of wilderness into croplands
2. Converting large stretch of wilderness into areas of recreation and tourism
3. Building roads
4. Building urban subdivisions
5. Flooding large areas of land by building dams and hydroelectric power generators

These may prevent gene-flow between the split populations. Over time isolated populations undergo adaptive radiation if environments are very different. Populations may die out if they do not adapt to environment.

And just because it is cool....a short video on the evolution of whales...they came from land!!!

