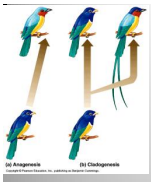
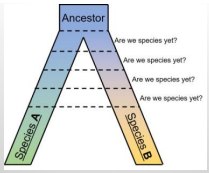
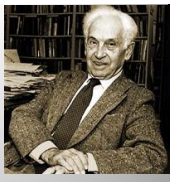
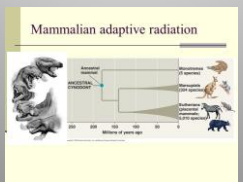




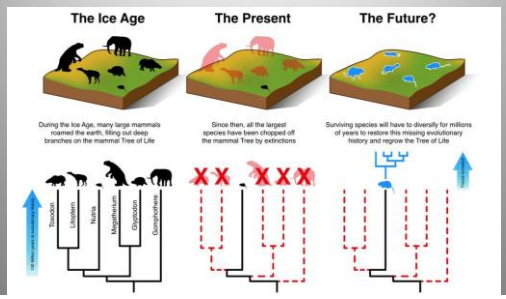


7.10 Speciation



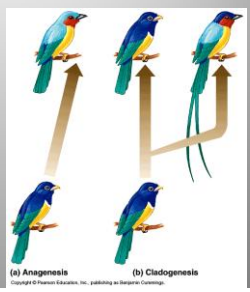
ENDURING UNDERSTANDING

EVO-3 Life continues to evolve within a changing environment.



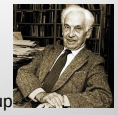
EVO-3.D Describe the conditions under which new species may arise.

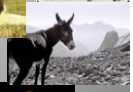
- Speciation may occur when two populations become reproductively isolated from each other.
  - Two patterns
    - Anagenesis
      - Phyletic evolution
      - Accumulation of heritable changes
    - Cladogenesis
      - Branching evolution
      - New species from a parent species that continues to exist
      - Basis of biological diversity



EVO-3.D Describe the conditions under which new species may arise.

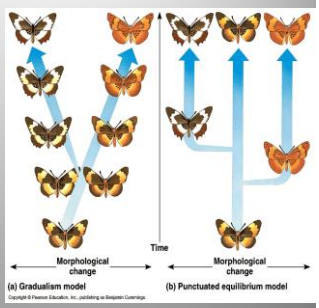
- The Biological Species Concept
  - Provides a commonly used definition of species for sexually reproducing organisms.
  - Species can be defined as a group capable of interbreeding and exchanging genetic information to produce viable, fertile offspring.
- Proposed by Ernst Mayr (1942)
  - Problems
    - Asexual organisms
    - Geographically isolated populations
    - Extinct species?





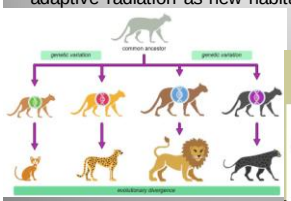
EVO-3.E Describe the rate of evolution and speciation under different ecological conditions.

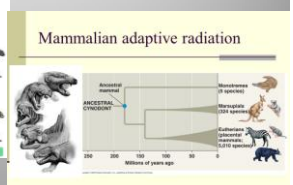
- Punctuated equilibrium is when evolution occurs rapidly after a long period of stasis.
- Gradualism is when evolution occurs slowly over hundreds of thousands or millions of years.



EVO-3.E Describe the rate of evolution and speciation under different ecological conditions.

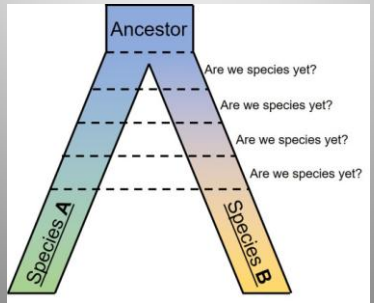
- Divergent evolution occurs when adaptation to new habitats results in phenotypic diversification.
- Speciation rates can be especially rapid during times of adaptive radiation as new habitats become available.





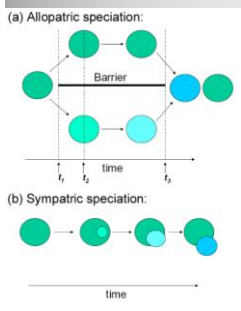
EVO-3.F Explain the processes and mechanisms that drive speciation.

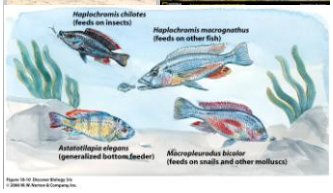
- Speciation results in diversity of life forms.



EVO-3.F Explain the processes and mechanisms that drive speciation.

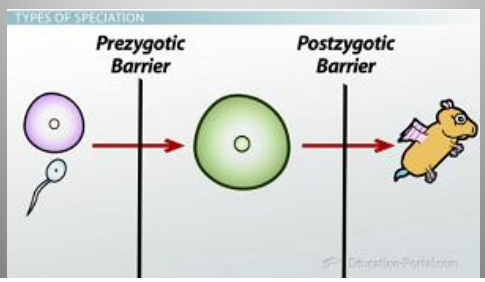
- Speciation may be sympatric or allopatric.





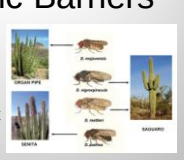
EVO-3.F Explain the processes and mechanisms that drive speciation.

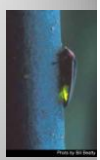
- Various prezygotic and postzygotic mechanisms can maintain reproductive isolation and prevent gene flow between populations.



Pre-zygotic Barriers

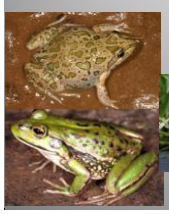
- Habitat Isolation: different locations in same area
- Temporal Isolation: different times in same area.
- Behavioral Isolation: different signals or pheromones.
- Mechanical Isolation: anatomical incompatibility.
- Gametic Isolation: sperm and egg don't fuse





Postzygotic Barriers

- Reduced Hybrid Viability: weak embyos or juveniles die (grassfrogs)
- Reduced Hybrid Fertility: horse + donkey = mule (sterile)
- Hybrid Breakdown: feeble or sterile F_2 generation (cotton)



Mare (Female Horse) *Equus caballus* 2n = 64 n = 32 X Jackass (Male Donkey) *Equus asinus* 2n = 62 n = 31 = Mule 2n = 63 n = ?

Stallion (Male Horse) X Jennyass (Female Donkey) = Hinny