Biology 10
Chapter 19-2
p546-552
"Patterns and Processes of Evolution"

Objectives

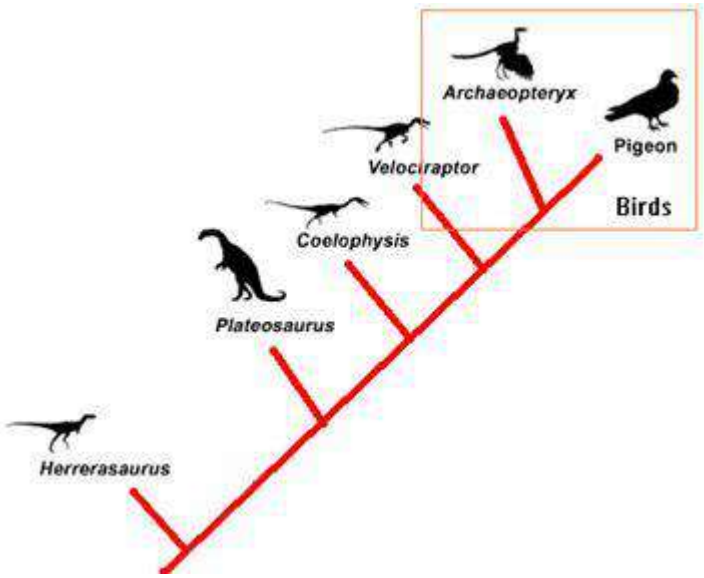
- Be able to identify processes that influence whether species and clades survive or become extinct.
- Describe what **gradualism** and **punctuated equilibrium** mean.
- Give examples of **adaptive radiation, convergent evolution, and coevolution**

Speciation and Extinction

- **macroevolutionary patterns**: _____ *in anatomy, phylogeny, ecology and behavior* _____
  _____
- includes speciation, and extinction

Macroevolution and Cladistics

- Fossil evidence is used to classify organisms into clades
- A cladogram does NOT imply that _____
  _____
- It instead shows how species branch off from _____



Adaptation and Extinction

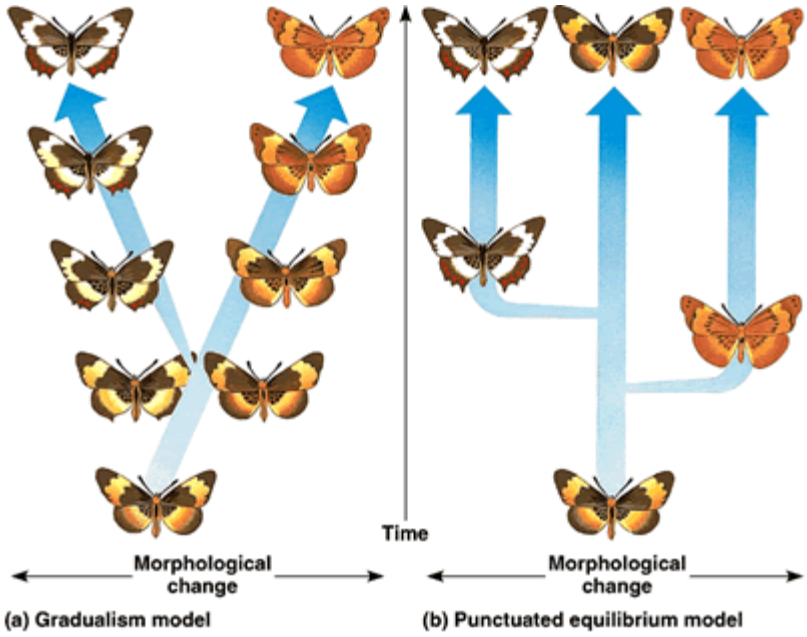
- Clades _____ under pressure from their environments
- Other species in the clade _____ as a result of this pressure
- If the rate of speciation _____ the rate of extinction, then the clade survives.
- Conversely, if the rate of extinction _____the rate of speciation, the clade will eventually go extinct.

Patterns of Extinction

- Species are going extinct all the time as they struggle to survive
- This level of extinction is called "_____"
- Alternately, once in awhile drastic environmental changes cause MOST species to go extinct
  - called a _____ event
  - mass extinctions are usually caused when multiple environmental changes hit at once
  - occasionally, a _____ can cause a mass extinction (ex: asteroids and dinosaurs)
  - While tragic, organisms that survive the mass extinction now have a golden opportunity to branch out quickly!

Rates of Evolution

- Two main patterns
  - **gradualism**: _____
    - how Darwin thought organisms evolved, which is correct for some species!
  - **punctuated equilibrium**: organisms don't change hardly at all for a long time, _____ over a brief period
    - also is evidenced in the fossil record!



Rapid Evolution After Equilibrium

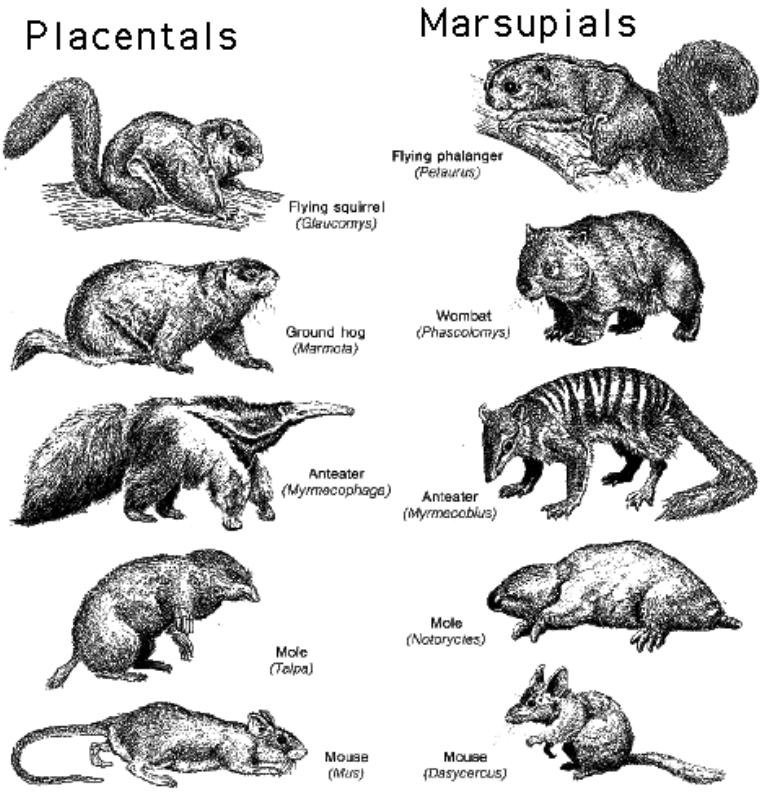
- Three situations where a species may evolve rapidly
  - 1) if a population _____ from the main population
  - 2) if a population _____
  - 3) survivors of a _____

Adaptive Radiation

- **adaptive radiation**: _____ _____ *that live in different ways*
- ex: _____ after the extinction of the dinosaurs.
- ex 2: Galapagoes finches

Convergent Evolution

- **convergent evolution**: evolution of _____ _____ in organisms that aren't closely related
- occurs as natural selection favors similar solutions to the same problem!
- ex: _____ mammals
- ex 2: shark, dolphin



Coevolution

- **<u>coevolution</u>**: the evolution of a species _____

  _____

  - ex: bats/moths
  - ex 2: _____