



Evolution in Progress **(Patterns of Evolution)**

Honors Biology
Facilitator: Mr. Lee
Room 320



Objectives

- ▶ **Identify important patterns of macroevolution**



Introduction

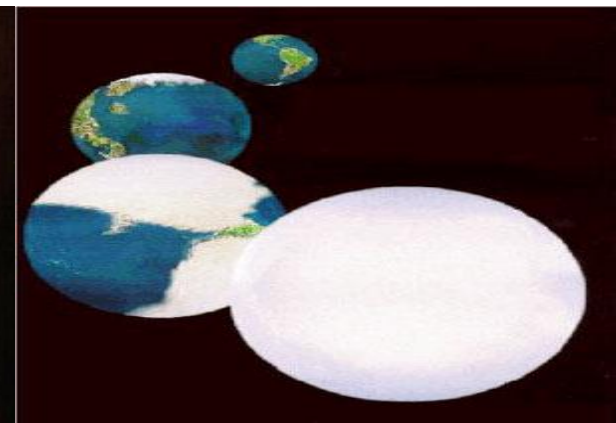


- ▶ **Macroevolution is a term used to describe large-scale evolutionary patterns**
- ▶ **Six important topics of macroevolution are:**
 - ▶ **Extinction**
 - ▶ **Divergent evolution**
 - ▶ **Convergent evolution**
 - ▶ **Coevolution**
 - ▶ **Punctuated equilibrium**
 - ▶ **Changes in developmental genes**



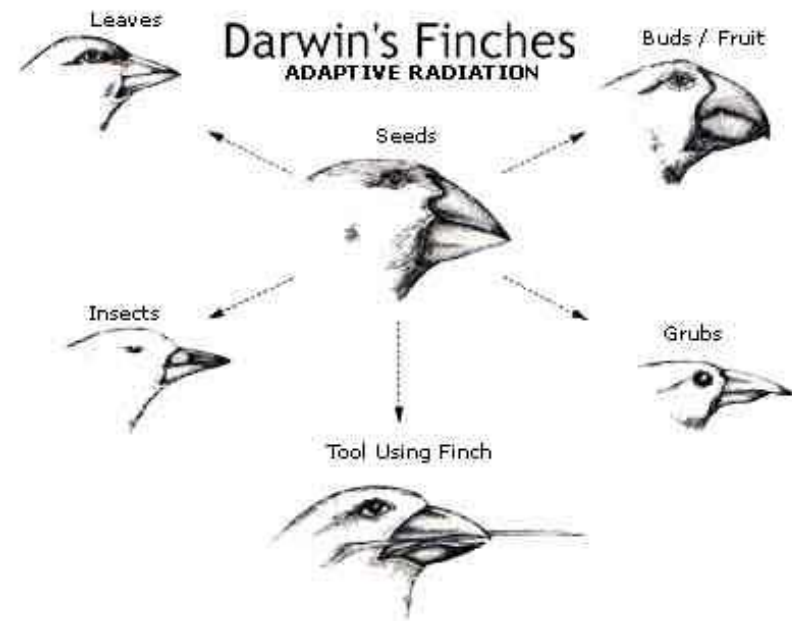
Extinction

- ▶ **More than 99% of all species that ever lived on Earth are now extinct.**
- ▶ **Several times in Earth's history there have been mass extinctions that whipped out entire ecosystems**
- ▶ **Each mass extinction left habitats open and provided ecological opportunities for those organisms that survived**



Divergent Evolution

- ▶ Two or more related populations or species become more and more dissimilar
- ▶ Darwin's finches evolved from a single species
- ▶ Diverge in response to types of food and different habitats



Divergent Evolution...

▶ Adaptive Radiation:

- ▶ Many related species evolve from a single ancestral species (Galapagos finches)
- ▶ Diverge in response to types of food and different habitats

▶ Artificial selection:

- ▶ Humans select what they want to breed
- ▶ Accounts for the many types of dogs
- ▶ Accounts for the many types of cows, even popcorn!



Convergent Evolution

- ▶ Some organisms look like they are related, but they are really not
- ▶ Similar environments can make similar phenotypes more fit
- ▶ Examples are sharks, penguins, and dolphins
- ▶ They all have streamlined bodies and appendages that help them to move through water



Falcon



Ancestral
bird



Bat



Ancestral
mammal



Pterodactyl



Ancestral
reptile

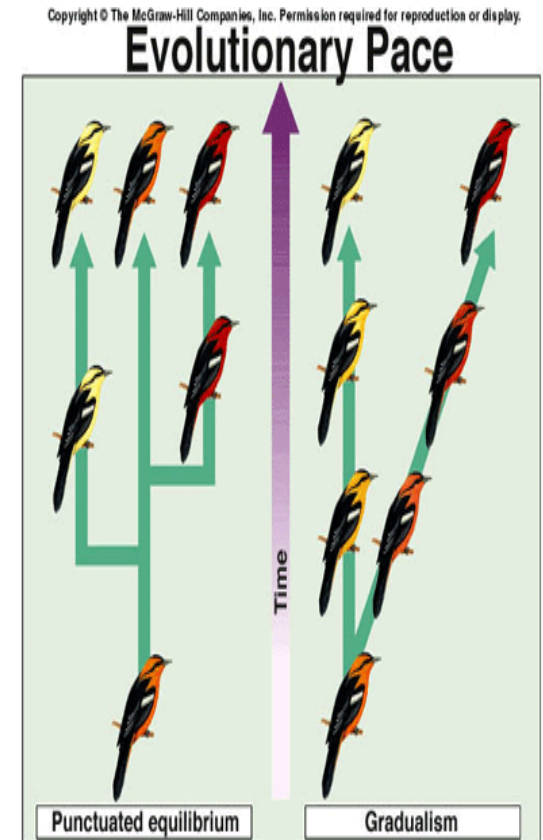
Coevolution

- ▶ The change of two or more species in close association with each other
- ▶ Predator and prey can coevolve
- ▶ Parasites and host can coevolve
- ▶ Can be beneficial to both organisms, as in bees and plants



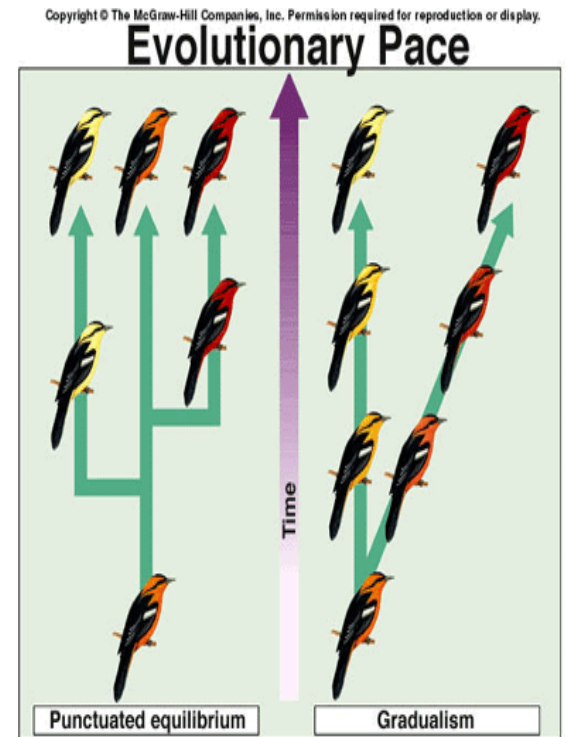
Punctuated Equilibrium

- ▶ Darwin believed that populations of organisms changed gradually over time (Gradualism)
- ▶ Punctuated equilibrium is a term used by scientist to describe a pattern of long, stable periods interrupted by brief periods or more rapid changes



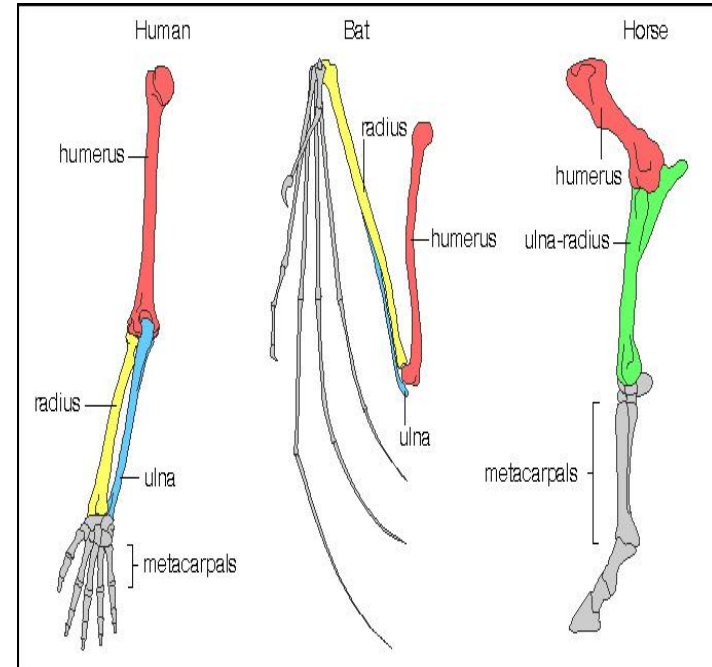
Punctuated Equilibrium...

- ▶ **Rapid evolution can occur for several reasons:**
 - ▶ **When a small population becomes isolated**
 - ▶ **Mass extinctions can open many ecological niches and provide new opportunities for the organisms that survive**



Changes in Developmental Genes

- ▶ Hox genes are “master control” genes
- ▶ Homologous control genes serve similar functions in animals and insects even though we haven't shared a common ancestor for 700 million years
- ▶ Changes to a Hox gene can cause drastic changes to the organism





Review...

- ▶ **Identify important patterns of macroevolution**
 - ▶ **Extinction**
 - ▶ **Divergent Evolution**
 - ▶ **Adaptive radiation**
 - ▶ **Artificial selection**
 - ▶ **Convergent evolution**
 - ▶ **Coevolution**
 - ▶ **Punctuated equilibrium**
 - ▶ **Changes in developmental genes**





Learn Long
Live Long