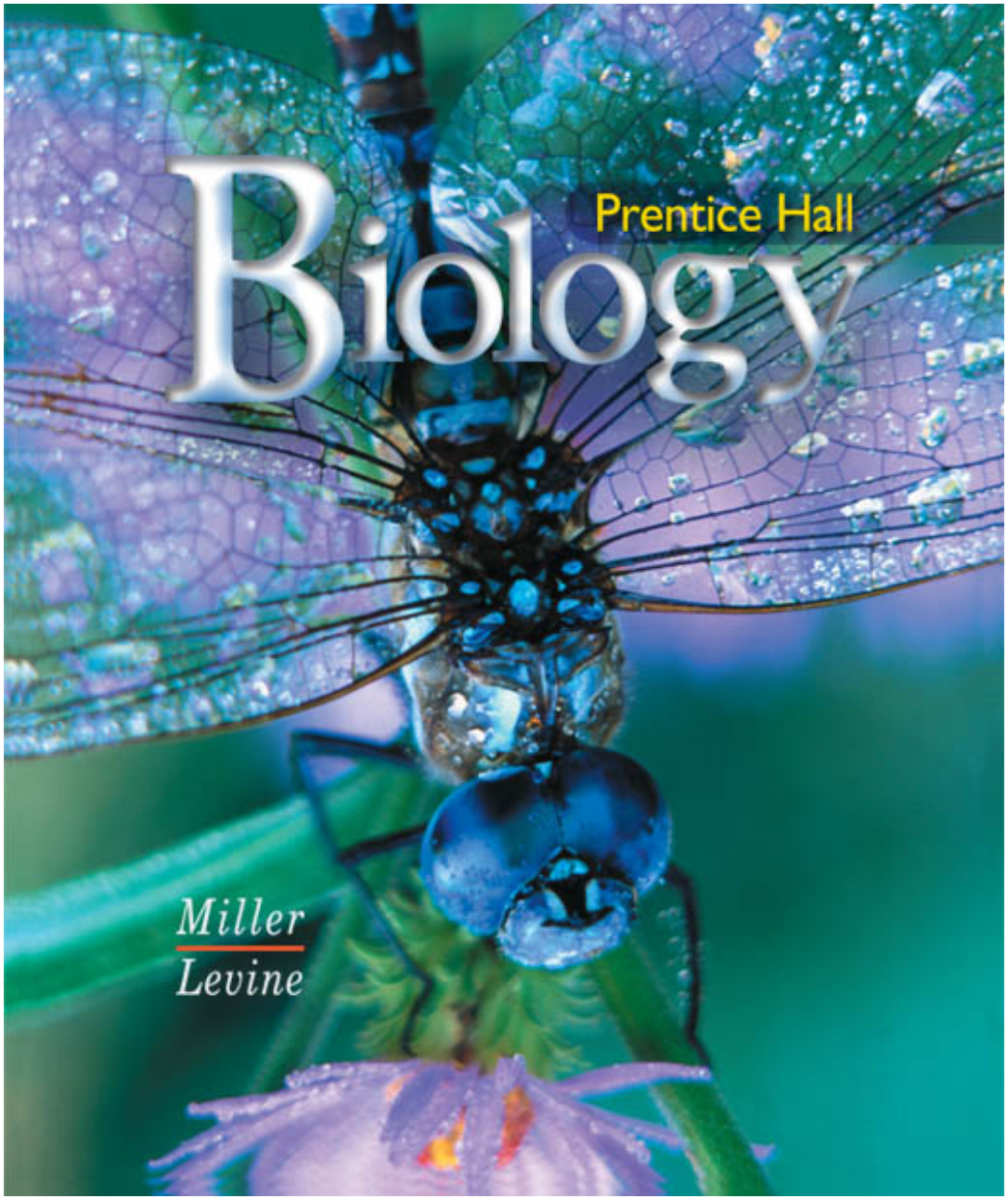
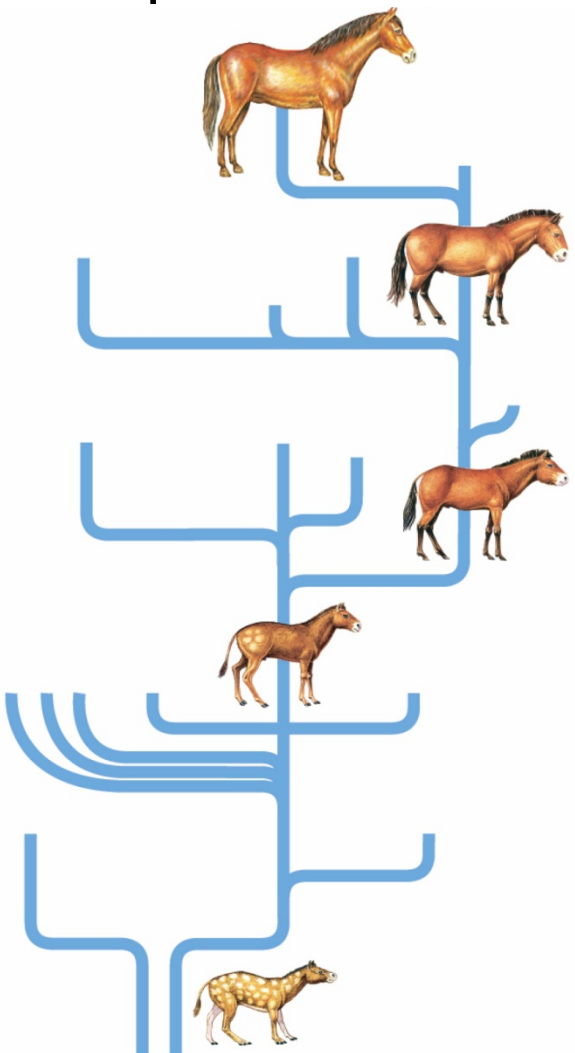
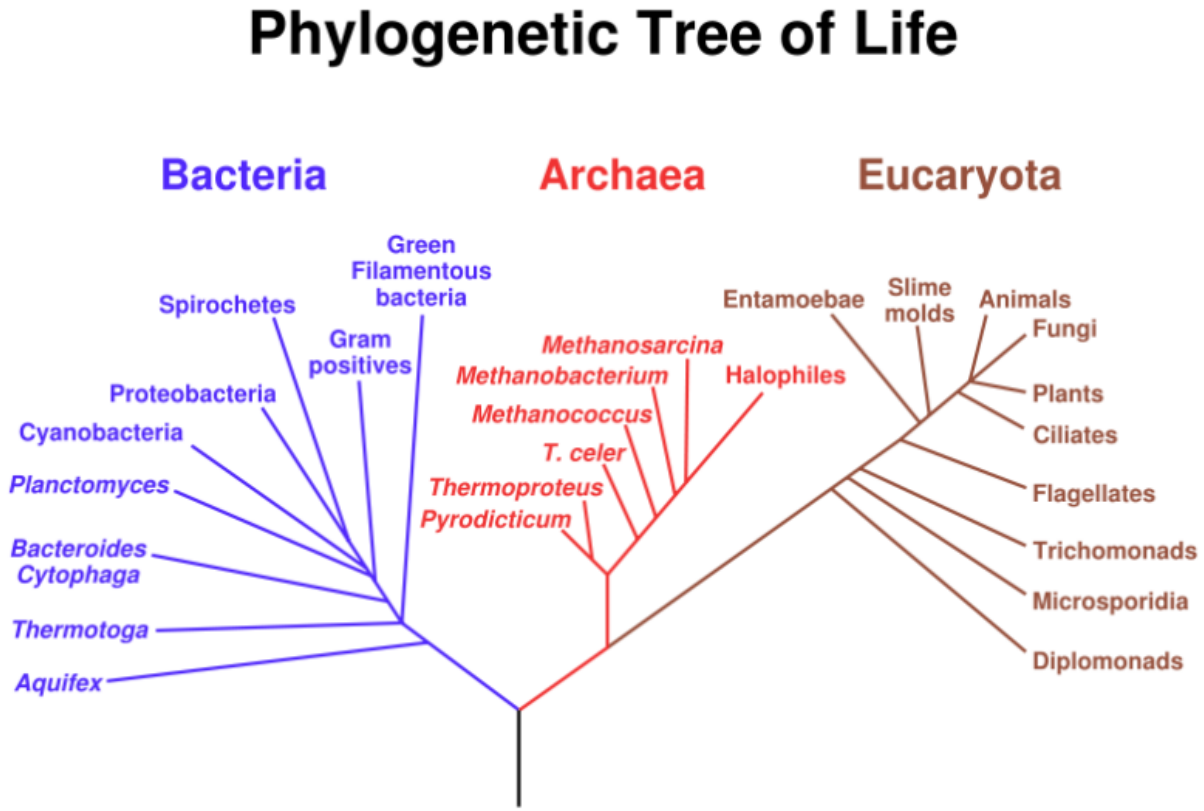


17-4 Patterns of Evolution

Macroevolution refers to large-scale evolutionary patterns and processes that occur over long periods of time.





Six important topics in macroevolution are:

- extinction
- adaptive radiation
- convergent evolution
- coevolution
- punctuated equilibrium
- changes in developmental genes

Extinction

More than 99% of all species that have ever lived are now extinct.

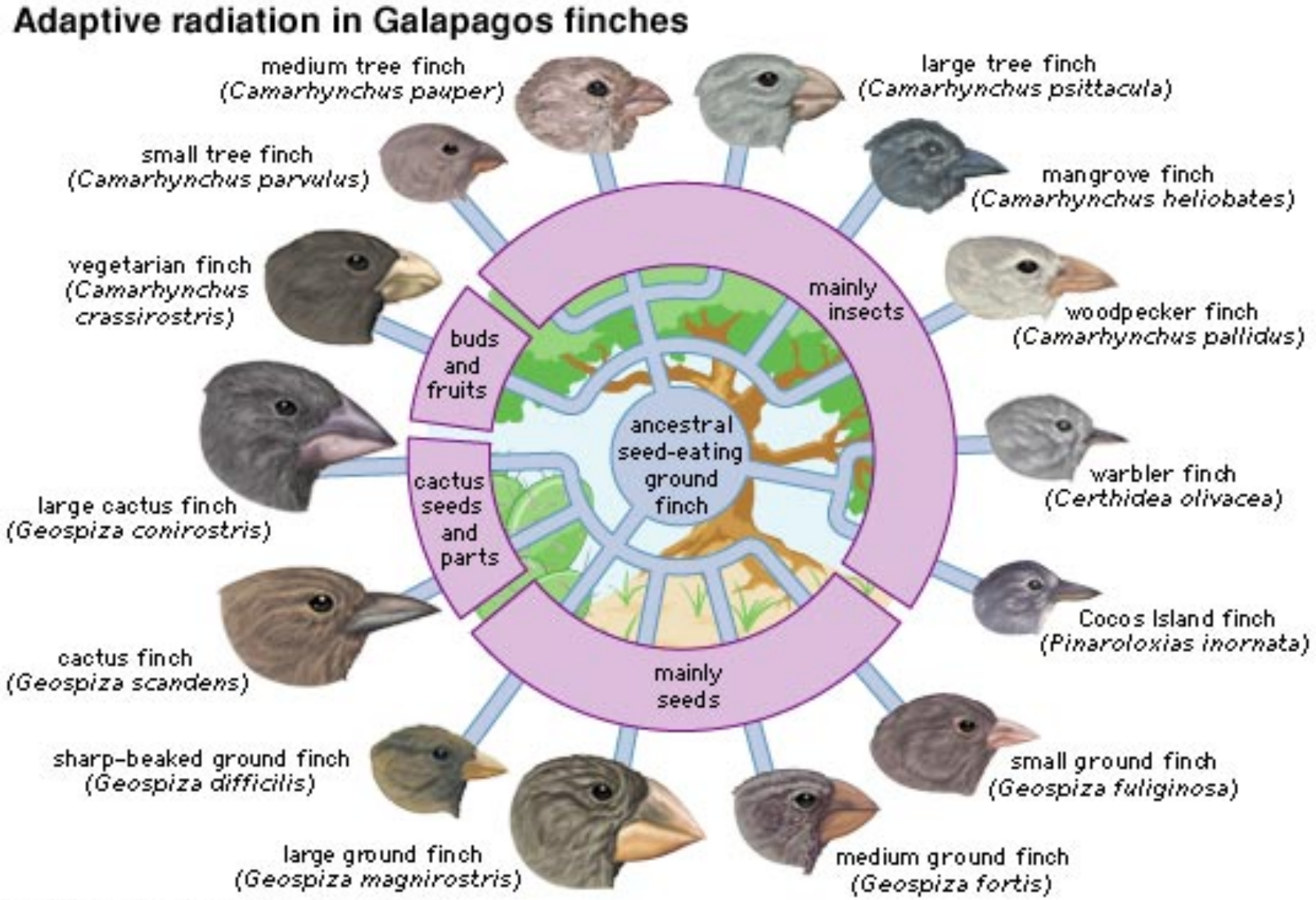
What effects have mass extinctions had on the history of life? Mass extinctions have:

- provided ecological opportunities for organisms that survived
- resulted in bursts of evolution that produced many new species

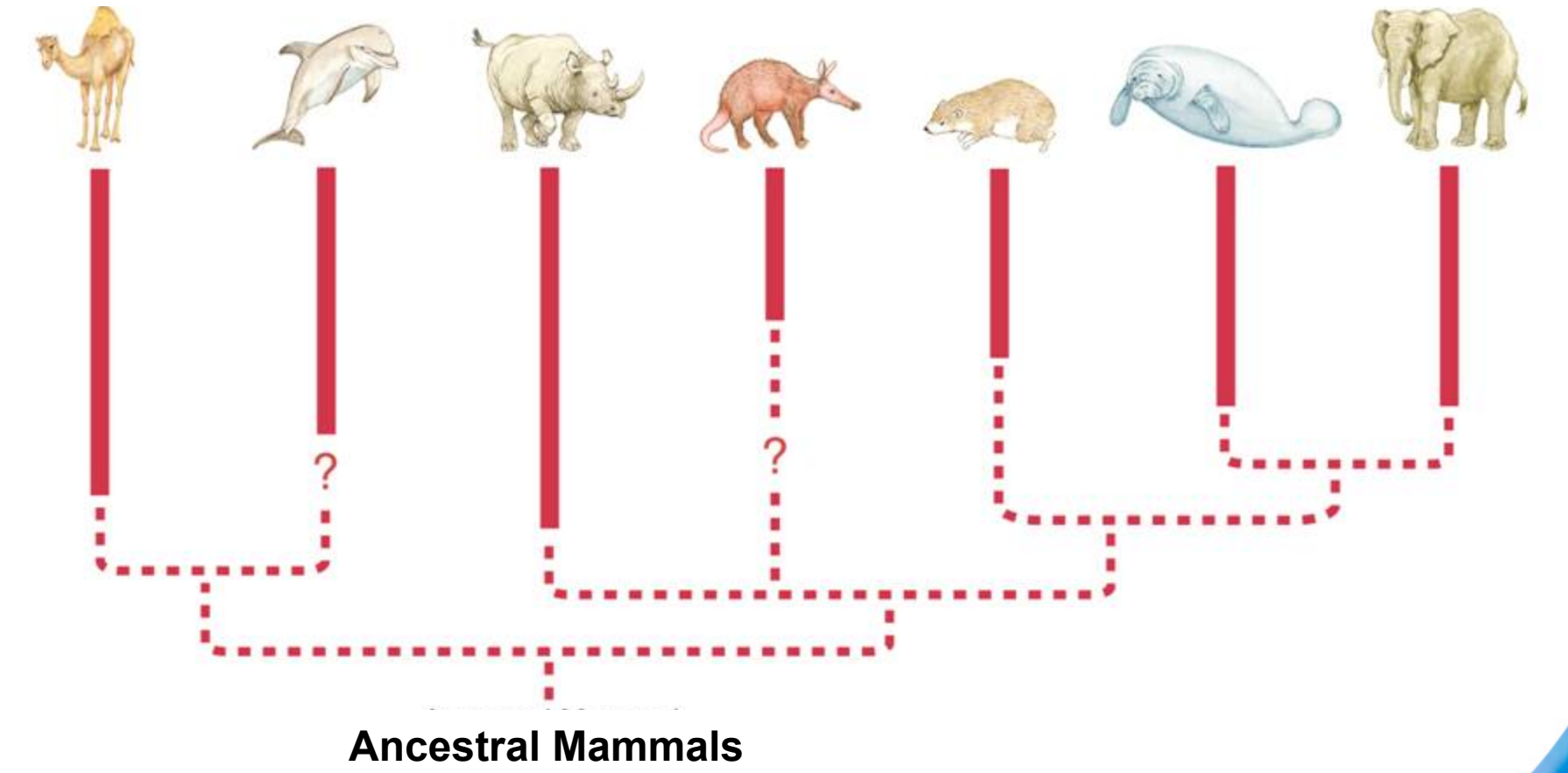
Adaptive Radiation

Adaptive radiation is the process by which a single species or a small group of species evolves into several different forms that live in different ways.

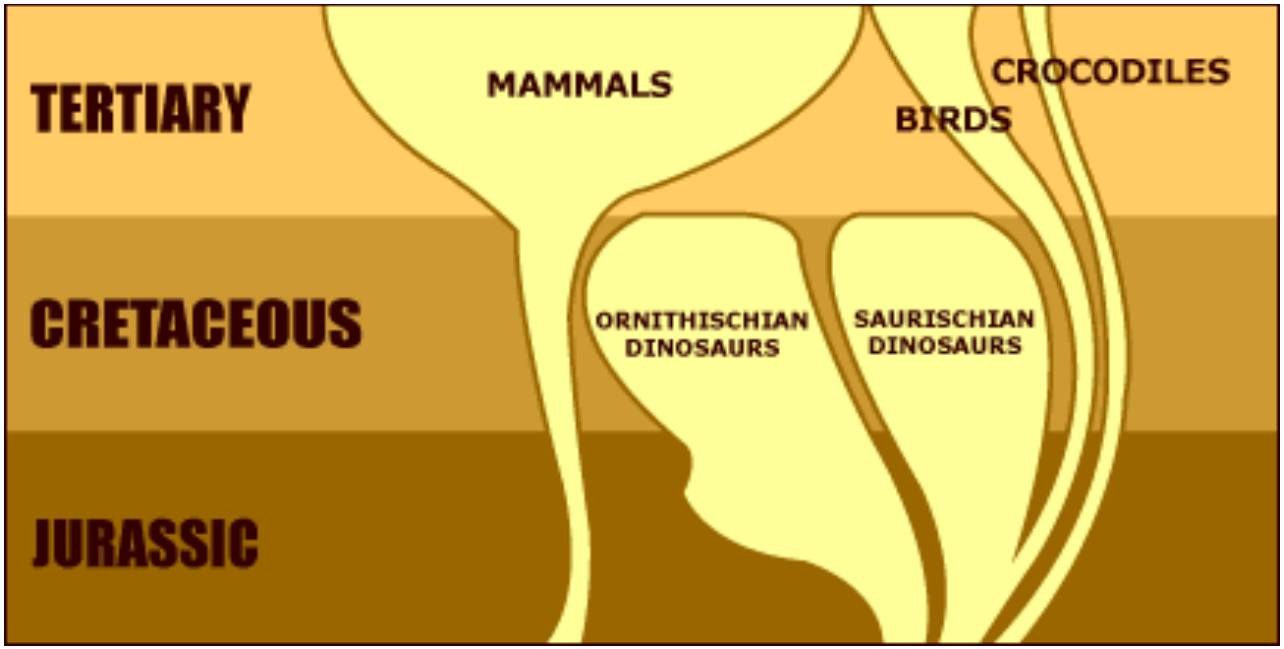
For example, in the adaptive radiation of Darwin's finches, more than a dozen species evolved from a single species.

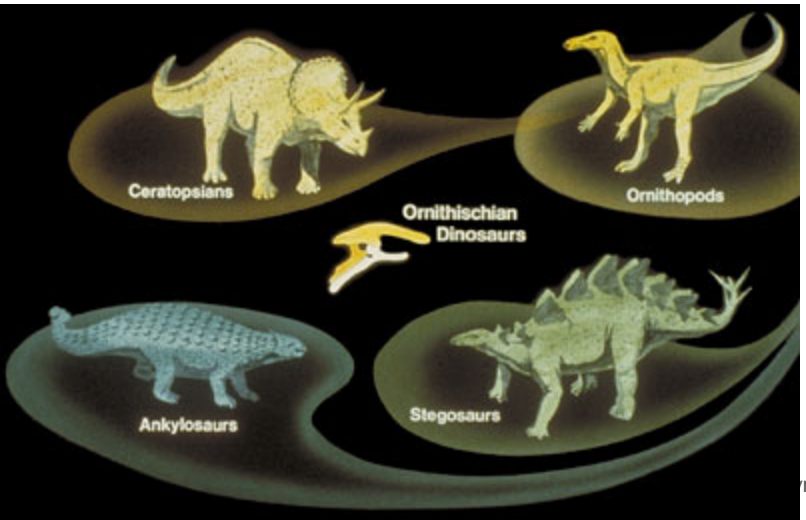


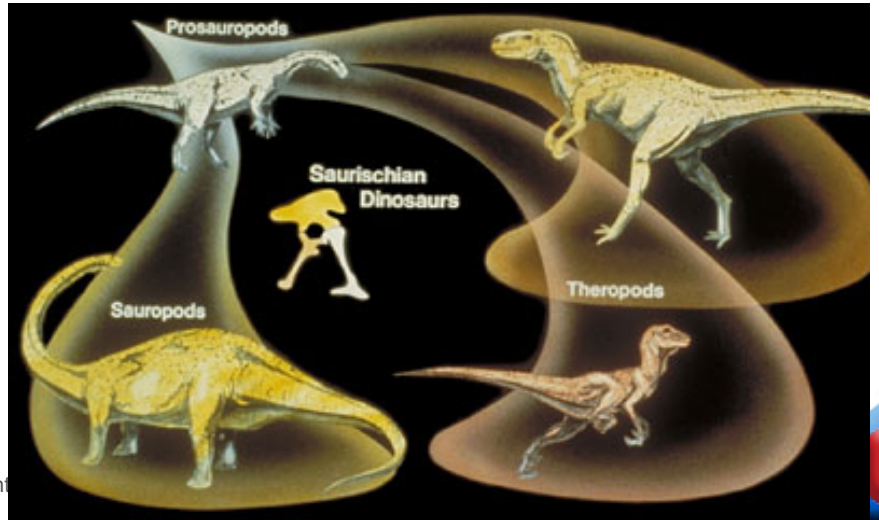
Adaptive Radiation of Mammals



17-4 Patterns of Evolution ➡ Adaptive Radiation







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Convergent Evolution

Different organisms undergo adaptive radiation in different places or at different times but in similar environments.

The process by which unrelated organisms come to resemble one another is called **convergent evolution**. Results in **analogous structures**.

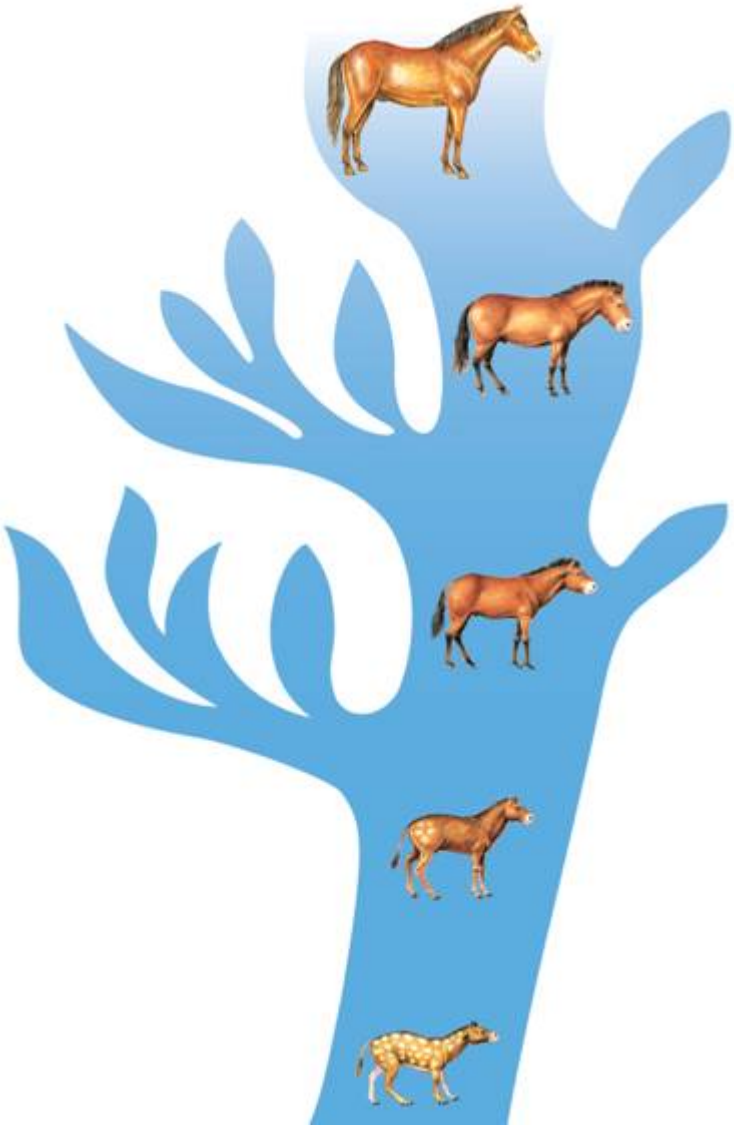
Coevolution

Sometimes organisms that are closely connected to one another by ecological interactions evolve together.

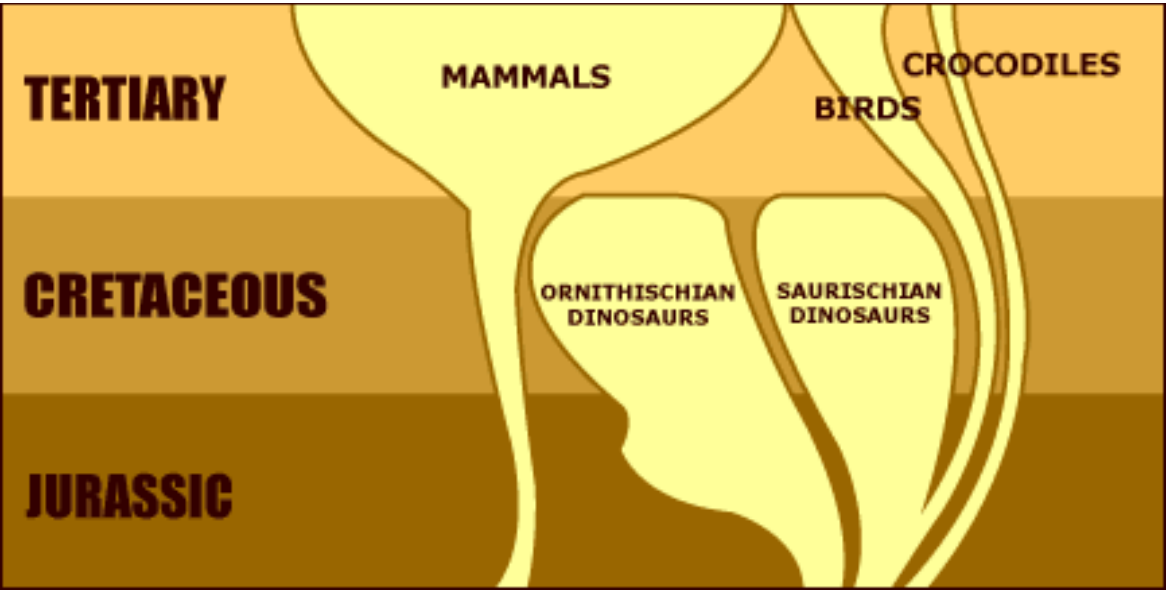
The process by which two species evolve in response to changes in each other over time is called **coevolution**.

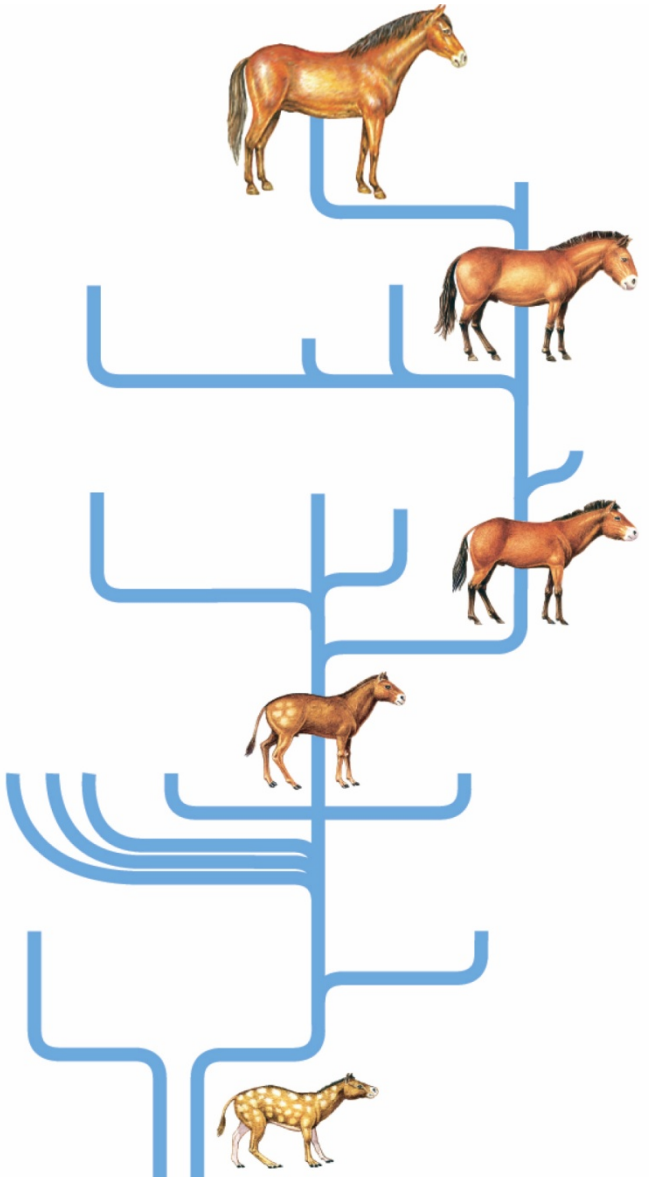
Punctuated Equilibrium

Darwin felt that biological change was slow and steady, an idea known as **gradualism**.



Punctuated equilibrium is a pattern of evolution in which long stable periods are interrupted by brief periods of more rapid change.

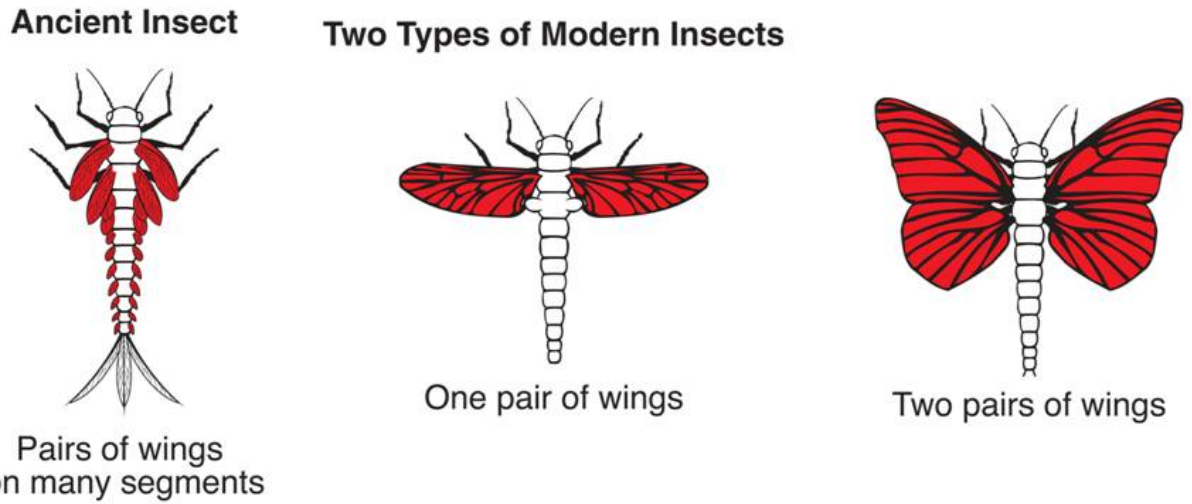


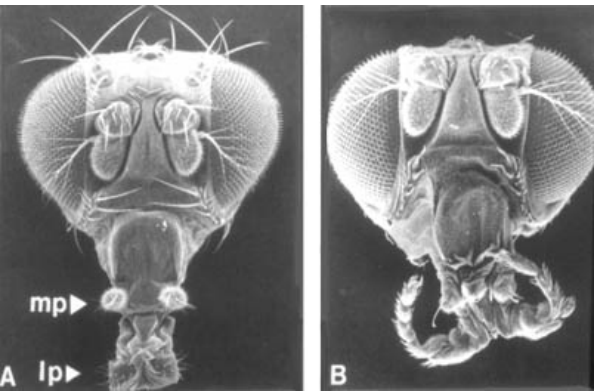


Developmental Genes and Body Plans

Hox Genes are the master control genes of body layout.

Evolution of Wings in Insects





17-4 Section QUIZ

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Section QUIZ

- or -

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17-4 Section QUIZ

1 Darwin's species of finches were very similar but different in beak size and feeding habits. This is an example of

a. convergent evolution.

b. coevolution.

c. adaptive radiation.

d. stabilizing selection.

2 A slow steady change in a particular line of descent is called

a. coevolution.

b. gradualism.

c. punctuated equilibrium.

d. convergent evolution.

3 Master control genes are called

a. hox genes.

b. developmental genes.

c. embryonic genes.

d. regulatory genes.

4 Some evidence suggests that species do not change much over long periods of time and then undergo relatively short periods of rapid speciation. This kind of change is called

a. coevolution.

b. genetic equilibrium.

c. adaptive radiation.

d. punctuated equilibrium.

5 Fossil evidence shows that mass extinctions

a. ended the existence of many species in a short period of time.

b. occurred mainly when the dinosaurs disappeared.

c. require an asteroid strike to occur.

d. caused convergent evolution among animals.

END OF SECTION