

Rate of Change

Lesson 3



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How do new species form?



What patterns describe the rate of evolution?

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How do new species form

Natural selection explains how variations can lead to changes in a species.

*A new species can form when a group of individuals remain isolated from the rest of its species long enough to evolve different traits that prevent reproduction

Isolation - cut off from the rest of the species
can happen by natural barriers like rivers

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The Kaibab and the Abert squirrels are separated by the Grand Canyon

The two kinds of squirrels are the same species, but have different variations

It is possible that one day these squirrels will become so different from each other that they no longer mate and will become a different species



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Kaibab and Abert Squirrels

**Kaibab****Abert**

- The Kaibab squirrel (*Sciurus aberti kaibabensis*) became geographically isolated from the common ancestor about 10,000 years ago.
- Its closest relative is the Abert squirrel (*Sciurus aberti aberti*)
- They live in opposite sides of the Grand Canyon

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What patterns describe the rate of evolution

The fossil record has provided scientists with a lot of information about past life on Earth

- * shows a variety of organisms have become extinct as their environment changes
- * appearance of newer species as older one vanish

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* Some times new species appear rapidly while other appear gradually

*Scientists have developed two patterns to describe the pace of evolution: gradualism and punctuated equilibrium

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Gradual change

Some species in the fossil record seem to change gradually over time

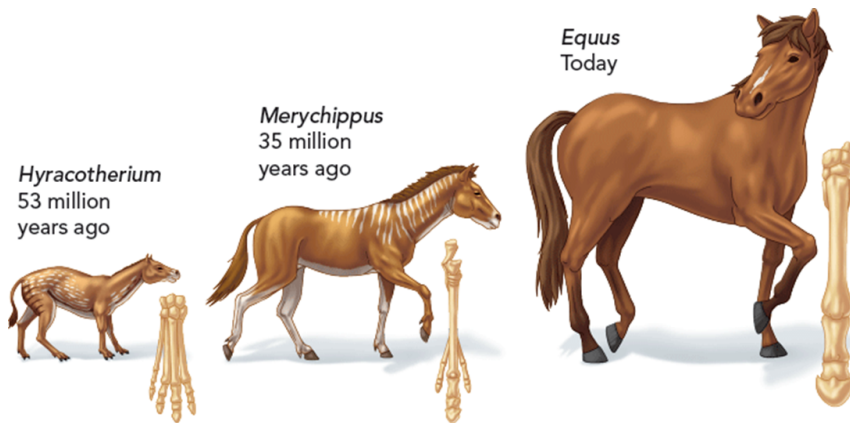
Gradualism involves small changes that add up to major to major changes over a long period of time

Since time scale involves hundreds, thousands, or million years, there is enough time for gradual change to produce new species

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Example

Merychippus - horse relative



Horse Evolution

Horses left a rich and detailed fossil record of their evolution. Many intermediate forms have been found between modern horses and their four-toed ancestors.

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Rapid Change

Scientists have also found that many species remain almost unchanged during their existence

*Shortly after they become extinct, related species often appear in the fossil record

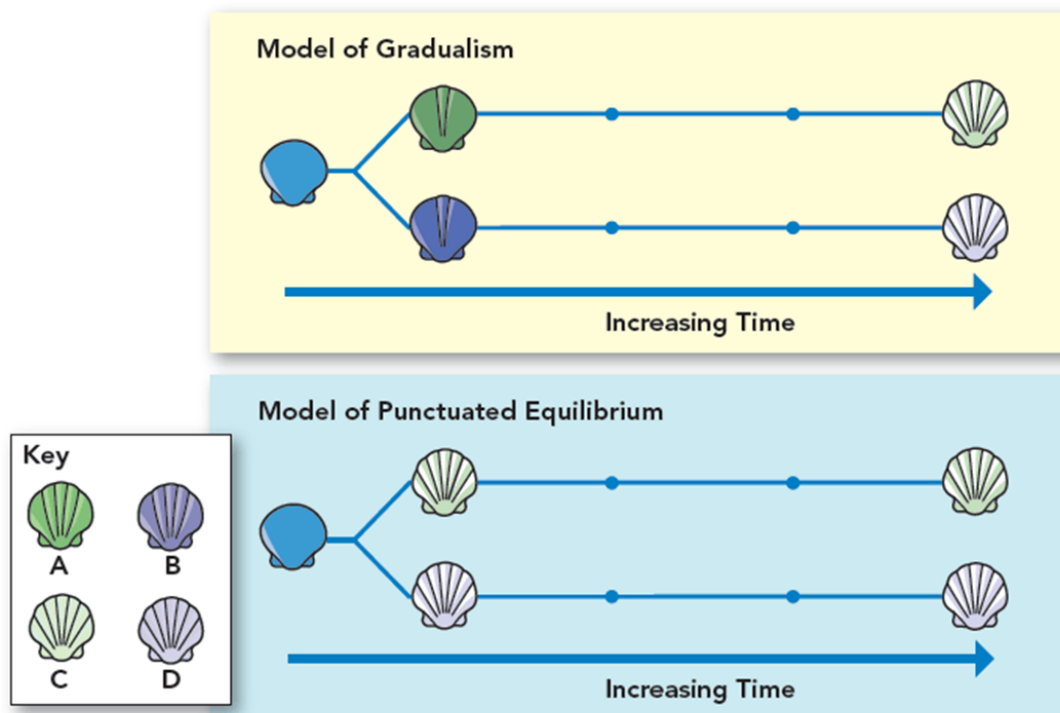
Punctuated equilibrium - a pattern in which species evolve during a short period of rapid change and then don't change much after

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Today, most scientists think the evolution can occur more rapidly at some times and slower at others

*Scientists have observed that some species of insects and bacteria have undergone significant changes in just a few years

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Model of Gradualism
and Punctuated Equilibrium
At what point does each shell belong on the timelines?

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