

# Evidence of Evolution

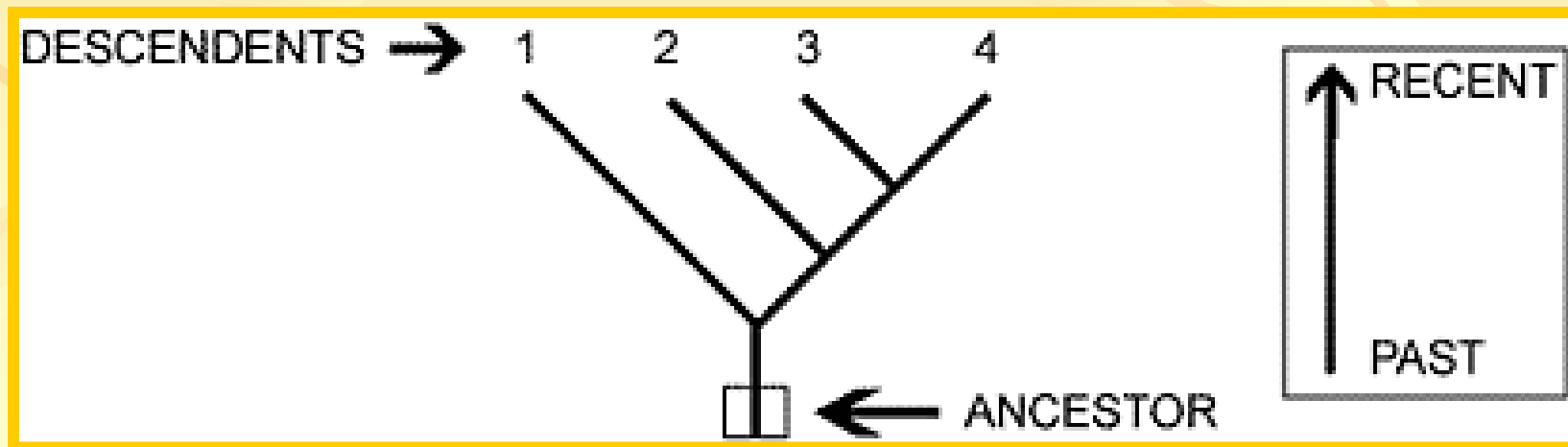
*The Fossil Record*

# What is Biological Evolution?

- ❖ Simply put, biological evolution is descent with modification.
- ❖ This definition includes:
  - ***small-scale evolution***: changes in gene frequency in a population from one generation to another
  - **large scale evolution**: the descent of different species from a common ancestor over many generations.

# What is Evolution?

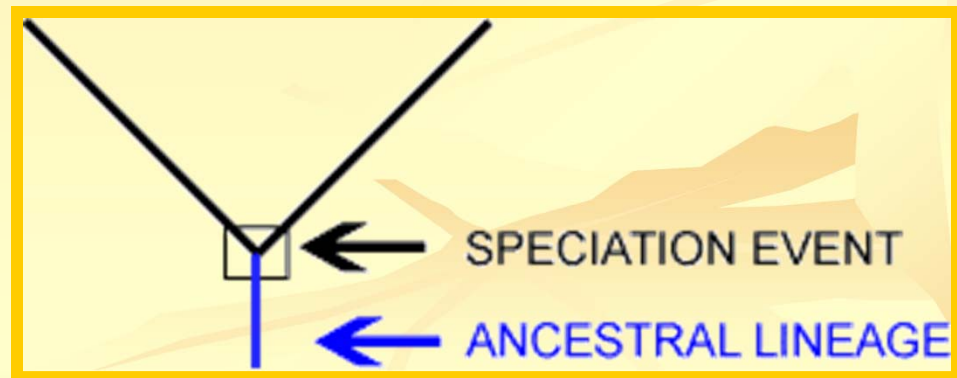
- ❖ The central ideas of evolution are that life has:
  - a history*
  - changes over time*
  - different species share common ancestors.*



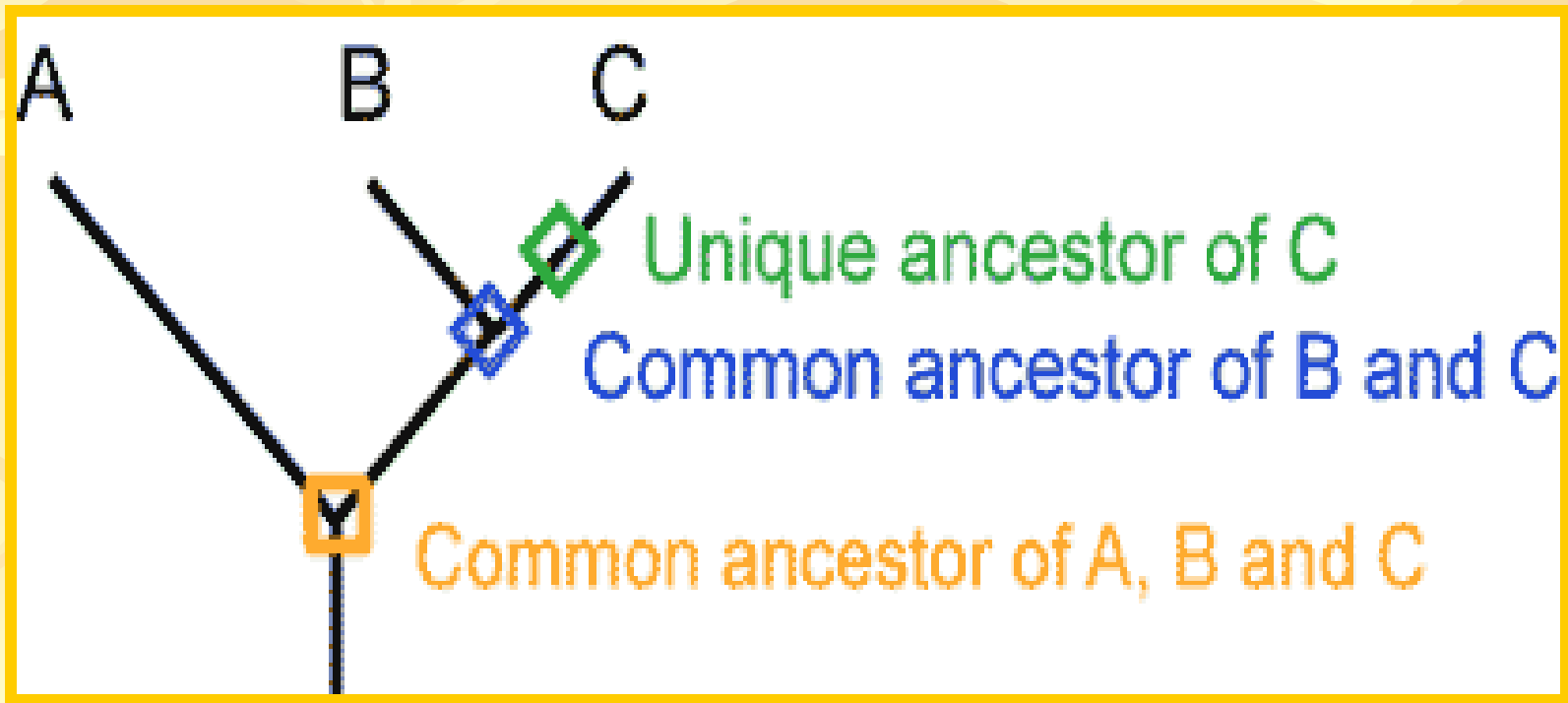
*Cladogram or family tree*

# Family Trees

- ❖ The root of the tree represents the ancestral lineage.
- ❖ The tips of the branches represent the descendants of that ancestor.
- ❖ When a lineage splits (speciation), a single ancestral lineage gives rise to two or more daughter branches or lineages. Each branch is a new species.

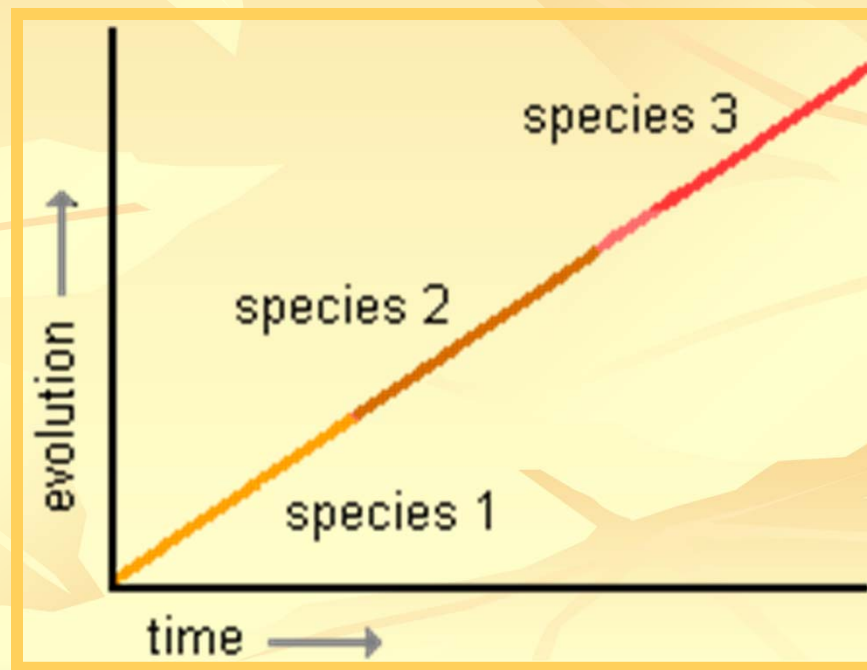


# Common Ancestry



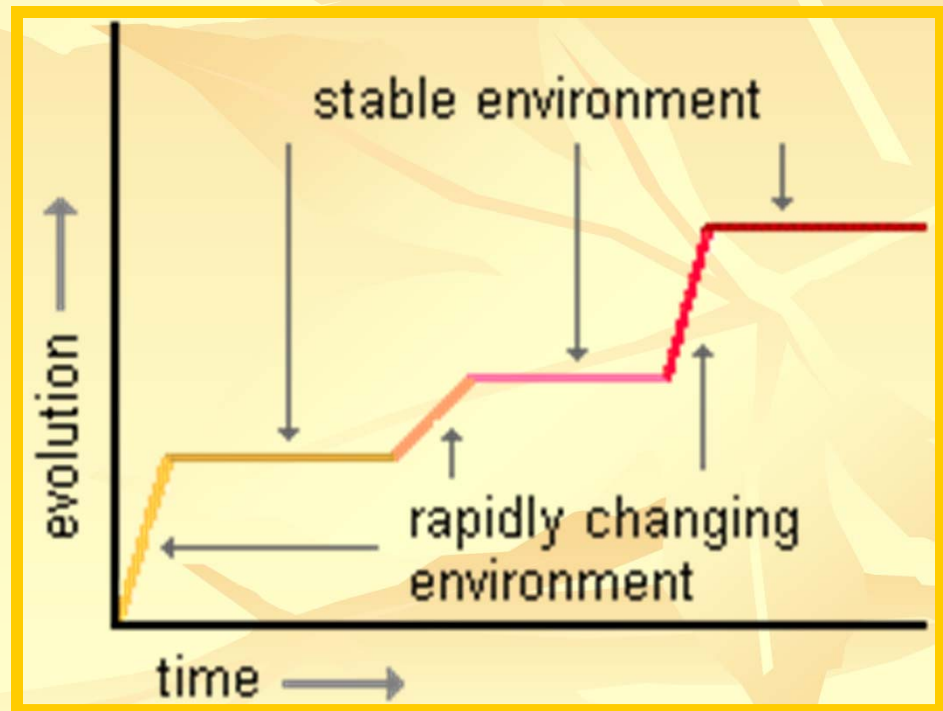
# Gradualism

- ❖ Evolution is a series of gradual long term changes that occur over time.
- ❖ Species evolve slowly at an even or steady pace.



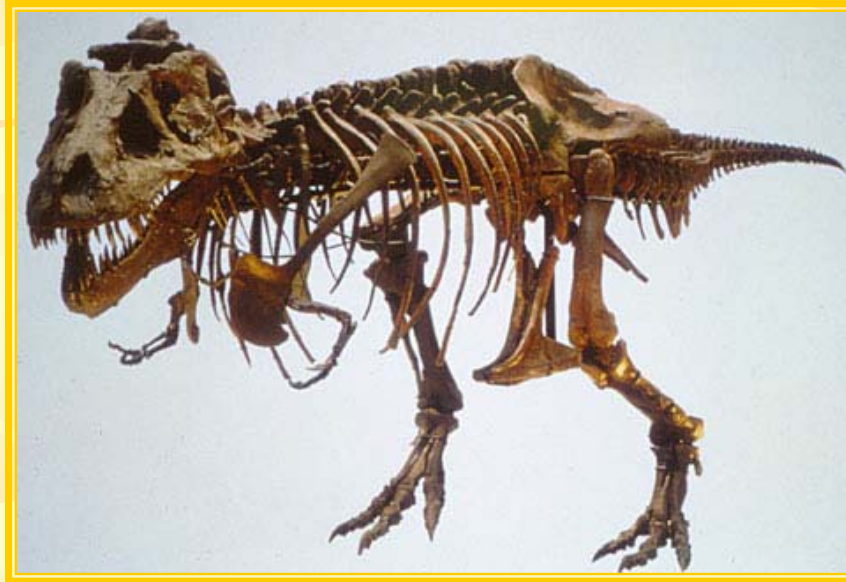
# Punctuated Equilibrium

- ❖ Species enjoy relatively long periods of little change punctuated with very rapid major change resulting in the development of new species (speciation).



# What is a Fossil?

**The remains or evidence of any organism that once lived on the Earth.**





# Fossils can be body parts of ancient organisms such as



*Sycamore  
leaf*



*Saber tooth tiger*



*shark tooth*



*ammonite shell*

# Fossils can also be *traces* left by organisms such as

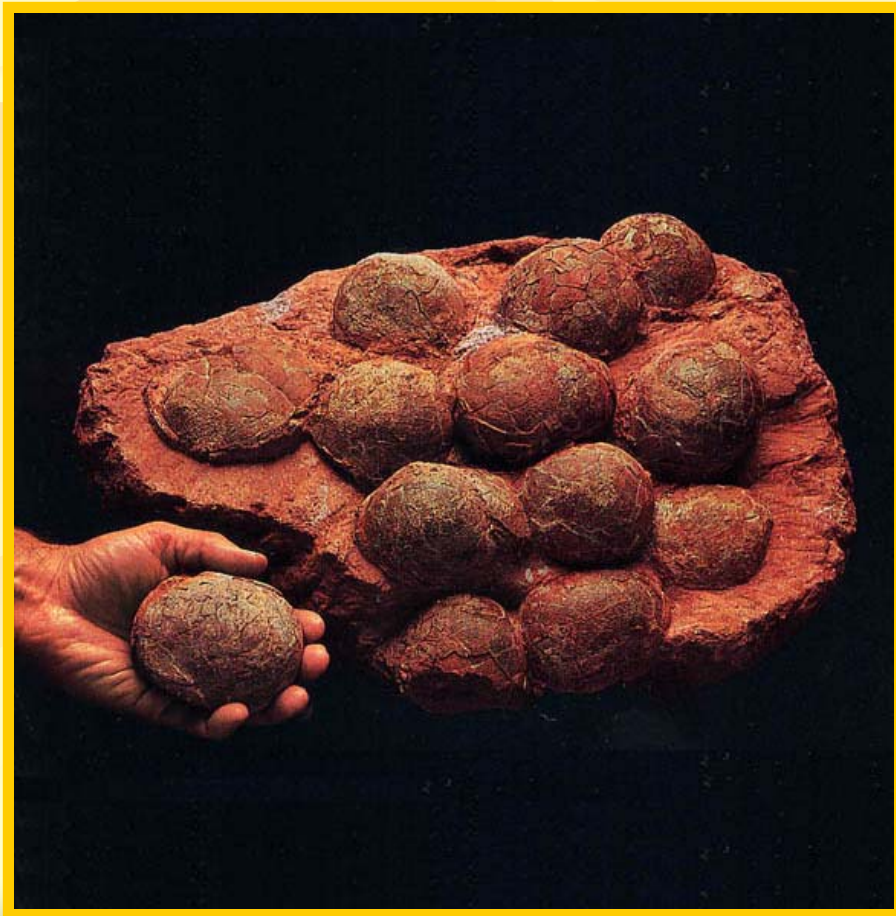


*carnivore coprolite  
(dinosaur feces)*



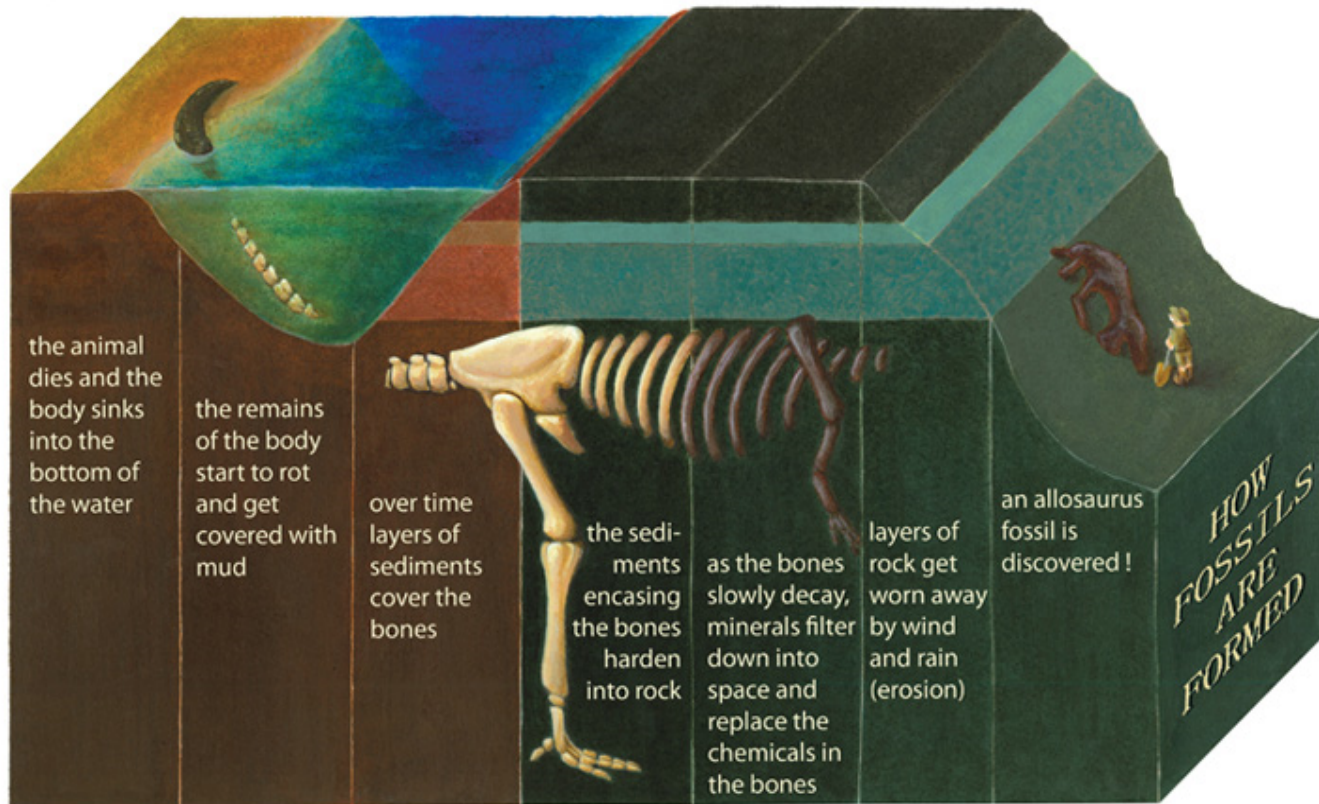
*dinosaur tracks*

*Dinosaur egg nest*



*dinosaur footprint*

# Fossils in Sedimentary Rock



How Fossils Are Formed © 2004 Juna Kurihara

# Mold and Cast Fossils



*Trilobite Fossils*

*Casts* are formed when sediment leaks into a mold and hardens to form a copy of the original structure.

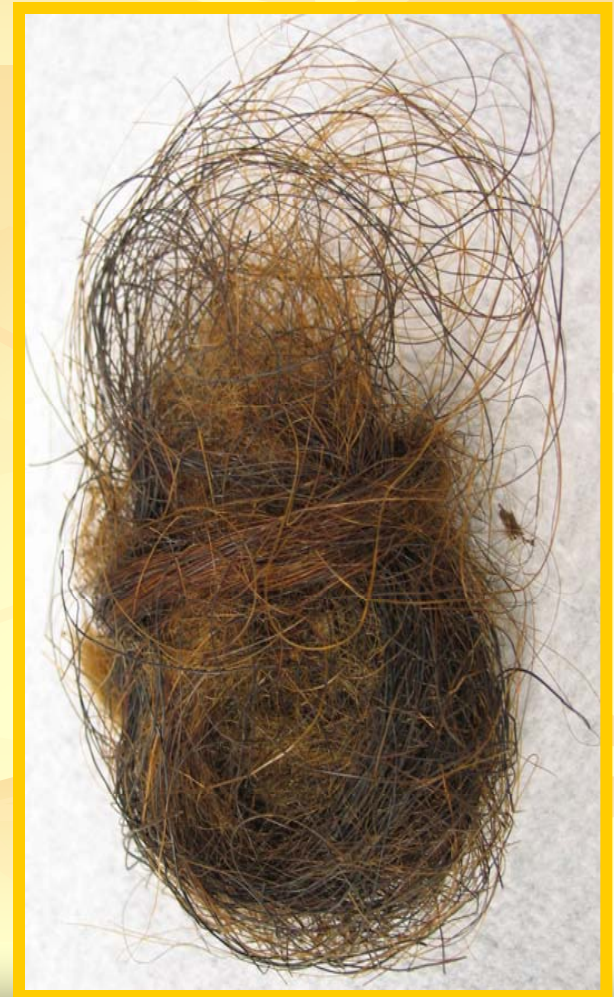
*Molds* are imprints left organisms that was buried. The structure decays and its imprint or mold is left in the sediment. The mold can be seen if the rock is broken open.

# Fossils Frozen in Ice



**Perfectly preserved baby woolly mammoth that died about 10,000 years ago. Found in the frozen tundra of Northern Russia (2007).**

**Woolly Mammoth Hair**





Otzi the Iceman, is Europe's oldest naturally preserved mummy. (3300 BC)

Otzi the Iceman was 5'5" tall, weighing in at 84 pounds. He was aged 46 years at the time of his death times. 57 tattoos of simple dots and lines.



# Fossils Preserved in Amber



**Amber fossils are formed when insects get trapped in tree sap. The tree sap hardens into *amber*, preserving the insects inside.**



# Fossils Preserved in Tar



**Fossils found during dig at the  
La Brea tar pits (California).**



**Saber tooth tiger**

# Petrified Fossils



**Minerals replace the cells and of the organism, effectively turning the structures of the organism into stone.**