

Evolution & Speciation

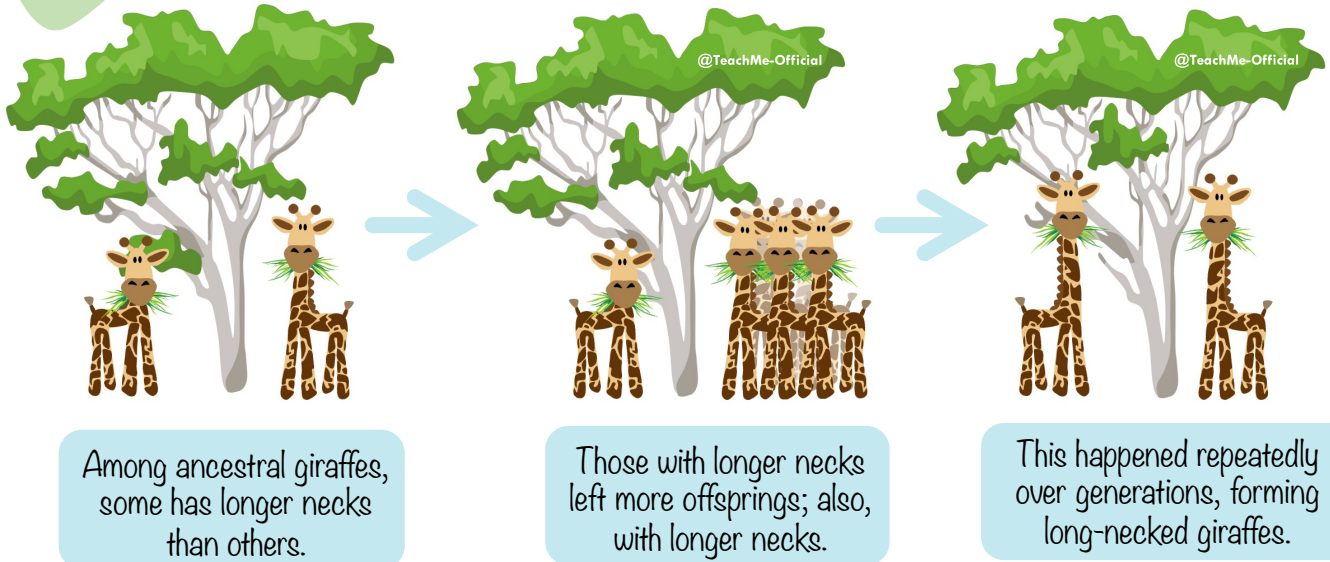
PART 1

EVOLUTION — The cumulative change in HERITABLE characteristics of a population over **GENERATIONS**.
passes on genetically

DOESN'T HAPPEN OVERNIGHT!

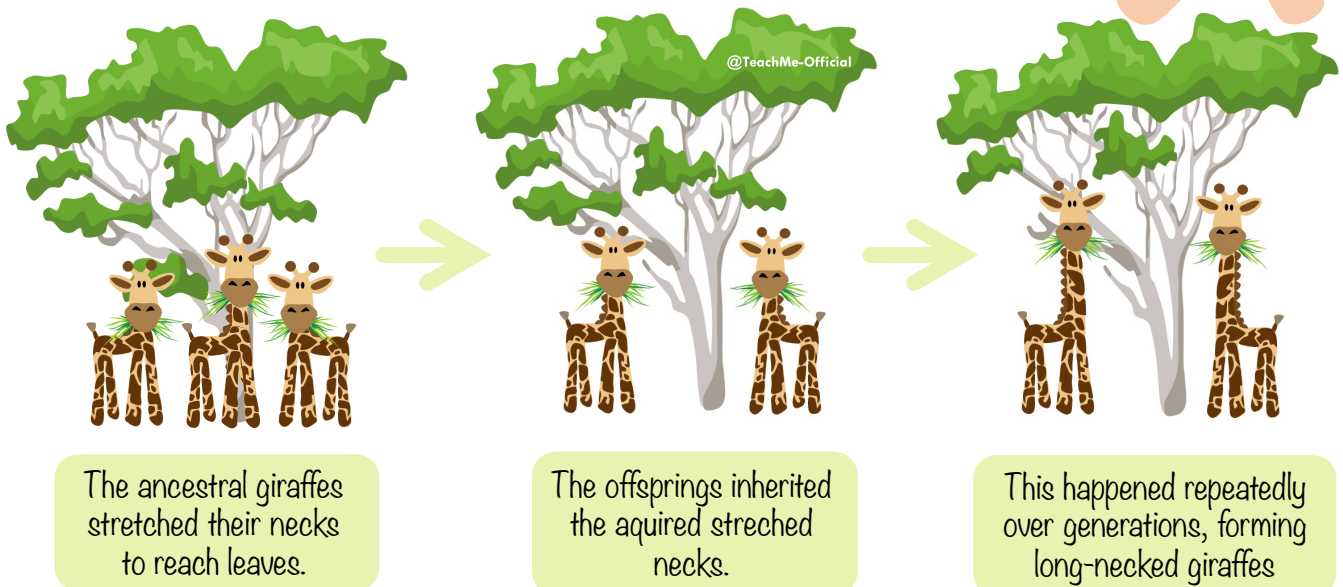
DARWINISM

Species have their own set of heritable differences (genetic) which have accumulated gradually over time.



LAMARKISM

Organism's aquired characteristics through their lifetime and passed them on to their offsprings.



EVIDENCE FOR EVOLUTION

- 1 Homologous Structures (Morphological)
- 2 Selective Breeding (Experimental)
- 3 Genetics (Molecular Level)

Evolution & Speciation

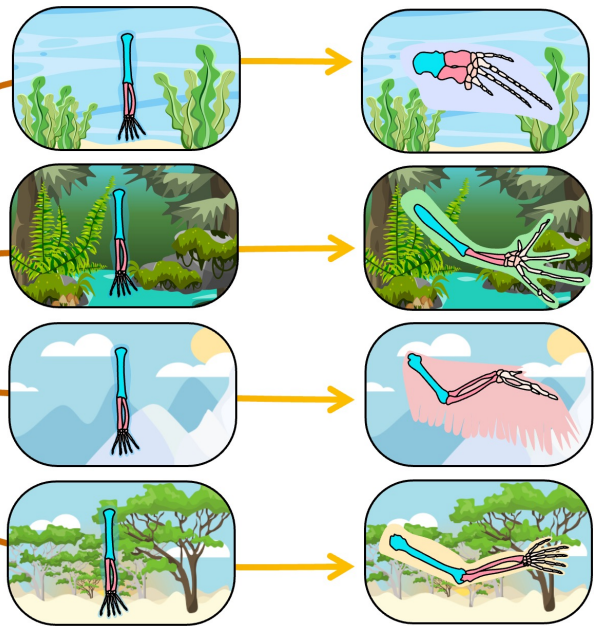
1 HOMOLOGOUS STRUCTURES (MORPHOLOGICAL)

Homologous structures are **ANATOMICAL FEATURES** showing **SIMILARITIES IN STRUCTURE**, but **DIFFERENCES IN FUNCTION**.
Common ancestor.



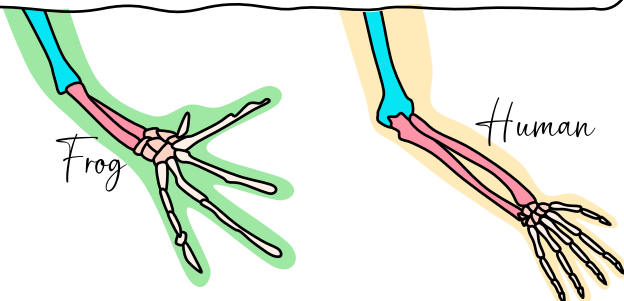
The pentadactyl limb originated from a common over time, as species encountered varied environments, natural selection acted upon the pentadactyl limb to optimize its structure for different functions.

Common Origin



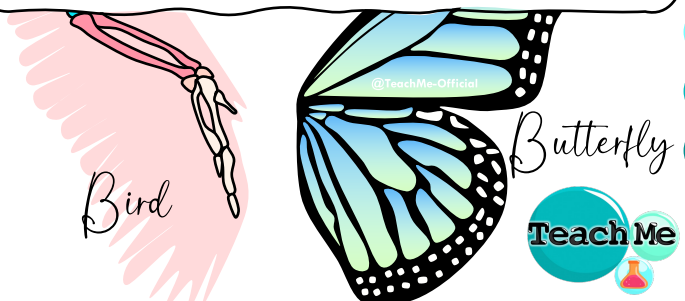
HOMOLOGOUS STRUCTURES

Homologous structures are **ANATOMICAL FEATURES** showing **SIMILARITIES IN STRUCTURE**, but **DIFFERENCES IN FUNCTION**. Recent common ancestor.



ANALOGOUS STRUCTURES

Analogous structures are **ANATOMICAL FEATURES** showing **DIFFERENCES IN STRUCTURE**, but **SIMILARITIES IN FUNCTION**. No recent common ancestor.

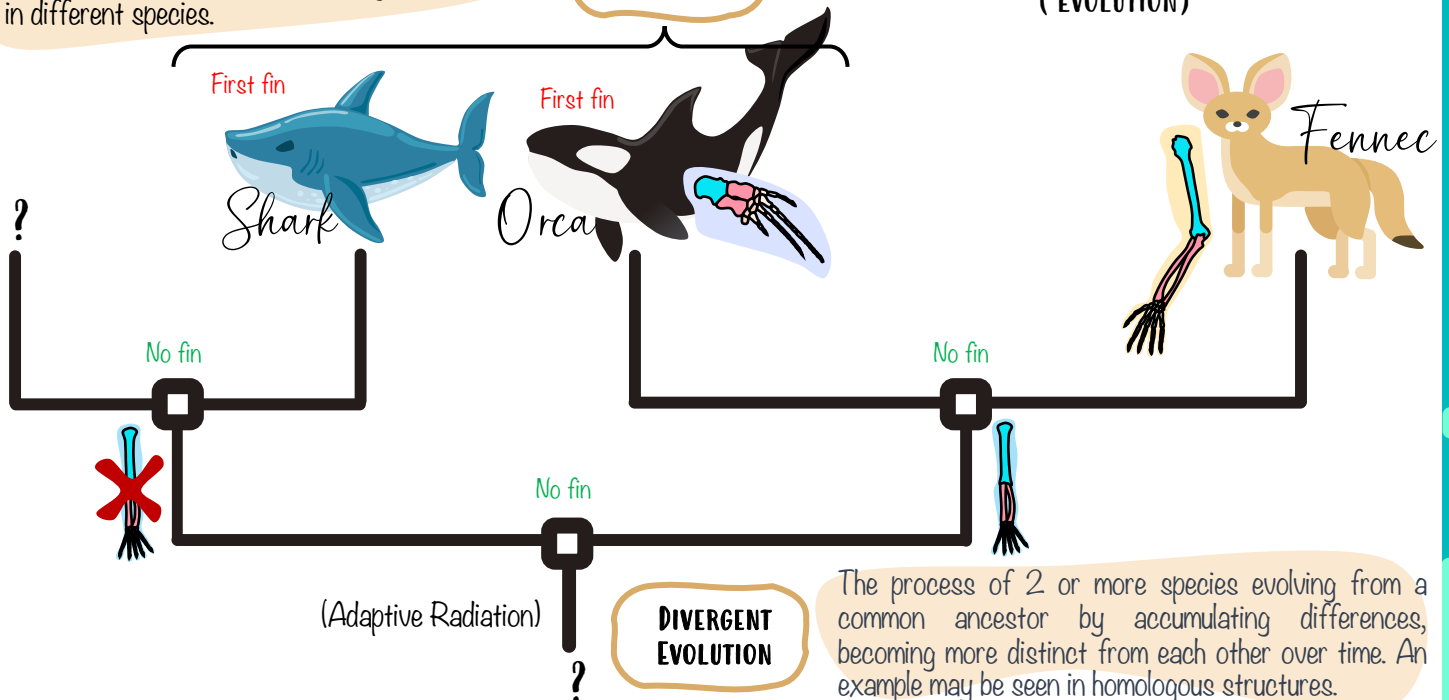


Evolution & Speciation

The process by which similar traits (features) arise in unrelated species (not a recent common ancestor). It often results in analogous structures in different species.

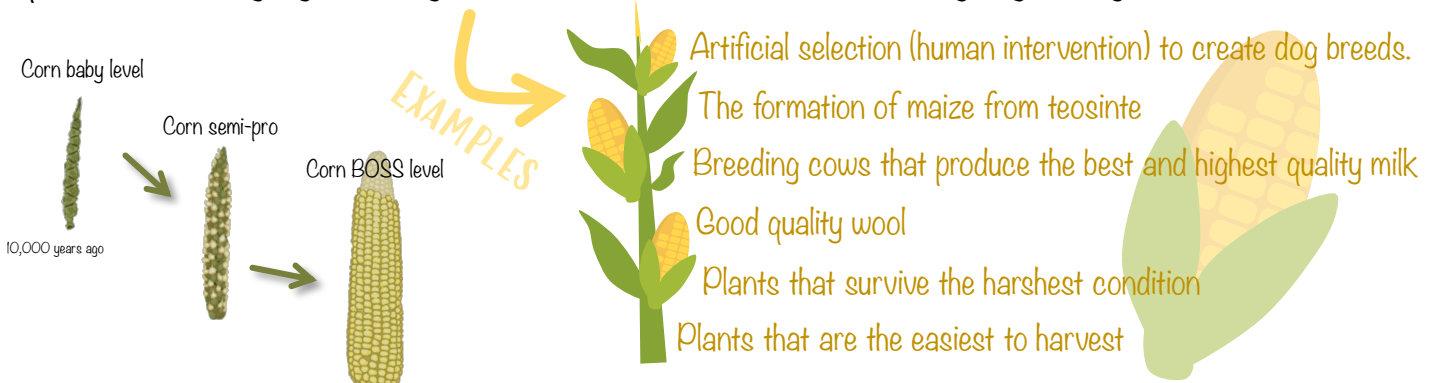
CONVERGENT EVOLUTION

CONVERGENT & DIVERGENT (EVOLUTION)



2 SELECTIVE BREEDING (EXPERIMENTAL)

A process of breeding organisms together for a desired trait. Can occur naturally or guided by humans.



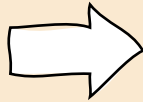
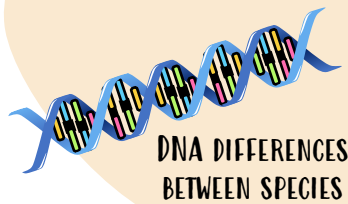
3 GENETICS (MOLECULAR LEVEL)

DNA changes occur with evolution. Over time organisms start changing along with genetics. Differences between DNA sequences can be examined to determine evolutionary relationship among different species.

Specific Species	Amino Acid Sequence (For a specific gene)
	SL--ALALSLGGGPLSAGELELHPPNFPWSHGGPLSALDHASVRRGFQVYRQVCSACHSM
	SLAVALSLSLGGGPVSAGELELHPPGLPWSHGGFLSALDHASVRRGFQVYRQVCSACHSM
	GLAVALH----SAVSAGELELHPPSPFWSHSGPLSSLDHSSVRRGYQVYKQVCSACHSM
	GLAVALH----TAVSASDLELHPPSYAWSHNGLLASLDHSSIIRRGYQVYKQVCAACHSM

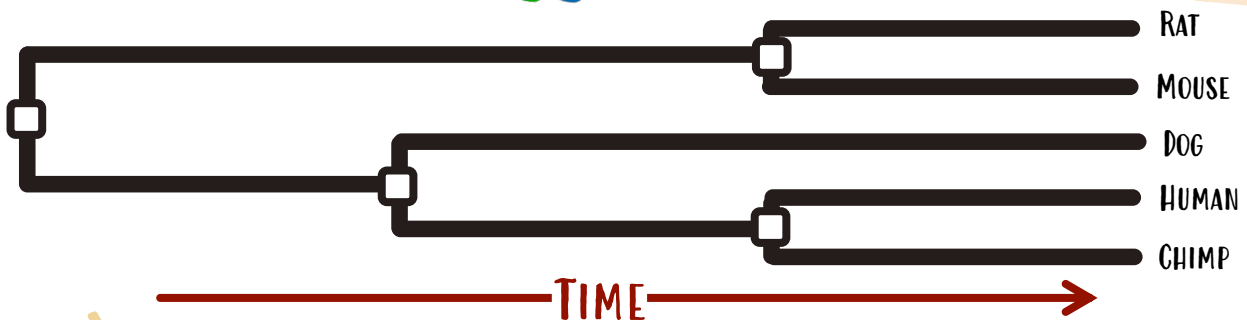
Evolution & Speciation

"Another way to assess the similarities and differences between organisms is through their **DNA & PROTEINS**"



AMINO ACIDS
DIFFERENCES BETWEEN
SPECIES

Not convenient, hence phylogenetic trees (another chapter)



PART II

SPECIATION

— Formation of new species (not gradual)
Occurs by **REPRODUCTIVE ISOLATION**

Geographical barrier
Behavioral barrier (HL)
Temporal barrier (HL)

A. [Congo River Example]

Habitat,
enemies,
food.

Congo river (barrier)

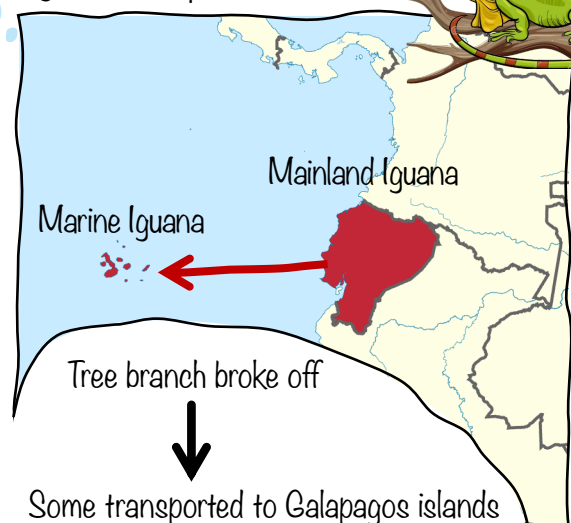


BONOBOS (matriarchal)
are more peaceful and
nomadic.



CHIMPANZEES (male
dominated) are more
aggressive and territorial.

B. [Iguana Example]



Different food, predators etc

Over time form Marine iguana
(speciation split)

EXTINCTION — When the last individuals of a species dies out.



99.99%

OF SPECIES THAT HAVE EVER LIVED ARE NOW EXTINCT.

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