

Theory of Natural Selection

Key insights that led to Darwin's Theory

1. artificial selection:

humans change a species by breeding it for certain traits.

example: dogs



* humans act as selective agents (we select the traits)

2. heritability:

ability of a trait to be passed down from one generation to the next.

3. Struggle for survival: limited resources + diseases

Natural Selection Explains How Evolution Can Occur

natural selection:

individuals that have inherited beneficial adaptations produce more offspring on average than do other individuals.

* environment acts as selective agent

4 principles of Natural Selection

1. Variation: heritable differences that exist in every population.
2. Overproduction: having many offspring increase the chance of survival but also results in competition of resources.
3. Adaptation: certain variation that allows an individual to survive better than individuals it competes with.
4. Descent w/ modification: more individuals will have the trait in every following generation as long as the environmental conditions remain beneficial for the trait.

Natural Selection acts on phenotype rather than genotype (new alleles are not made by natural selection—they occur by genetic mutations)

Evidence of Evolution

Sources of evidence

1. fossil - remains of past organisms
2. geography - Darwin proposed island species closely resemble species from the nearest mainland
3. embryology: embryos are very similar while adult forms are different
4. anatomy - comparing body parts of different organisms

homologous structure

similar structure
different function

ex: forelimbs of humans, bat, cat
recent
descended from a common ancestor

analogous structure

Similar functions, different
wings structure
ex: bats - bones

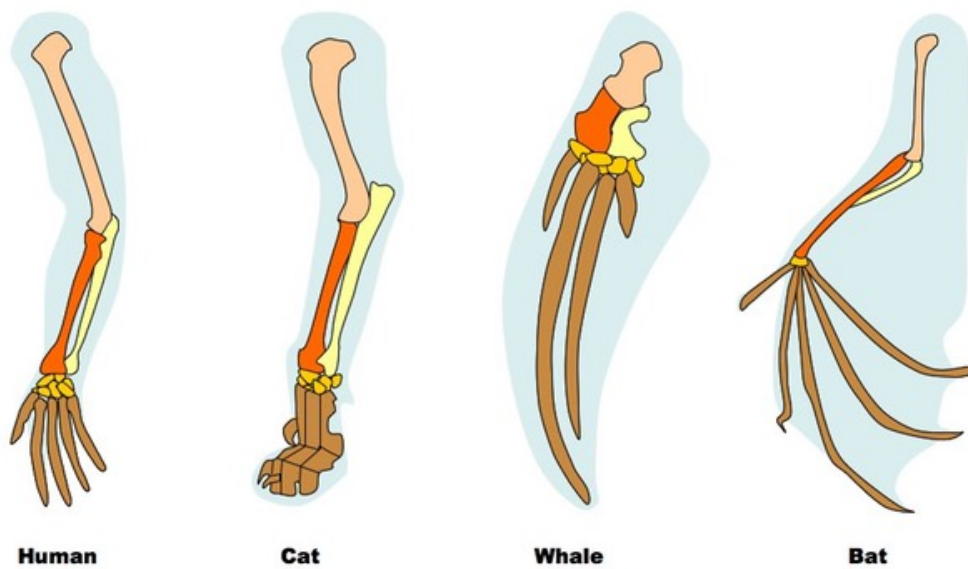
insects - no bones
membranes
do not share a recent common ancestor.

Both of their ancestors faced similar environmental challenges

Vestigial structure

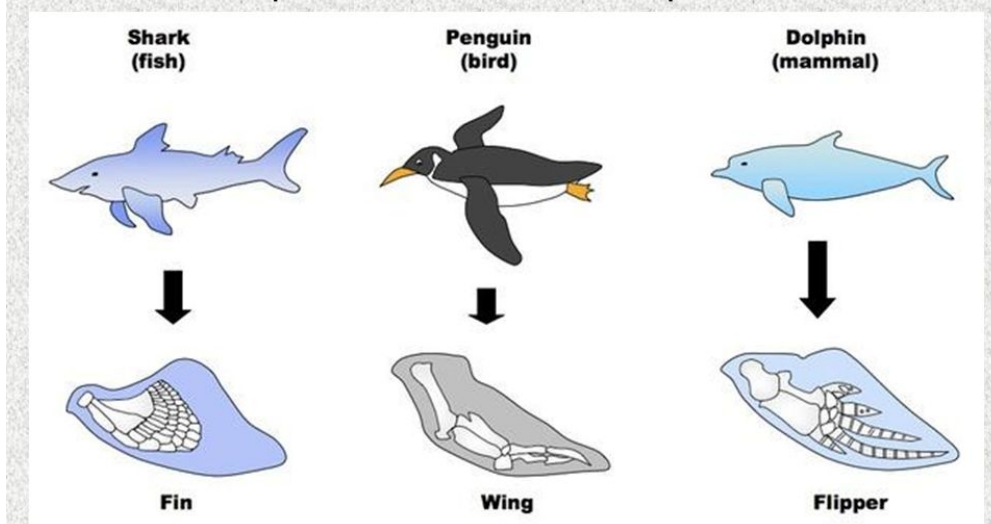
underdeveloped/unused
(was used in previous ancestors)
ex: ostrich wings
pelvic bones in snakes

homologous structures

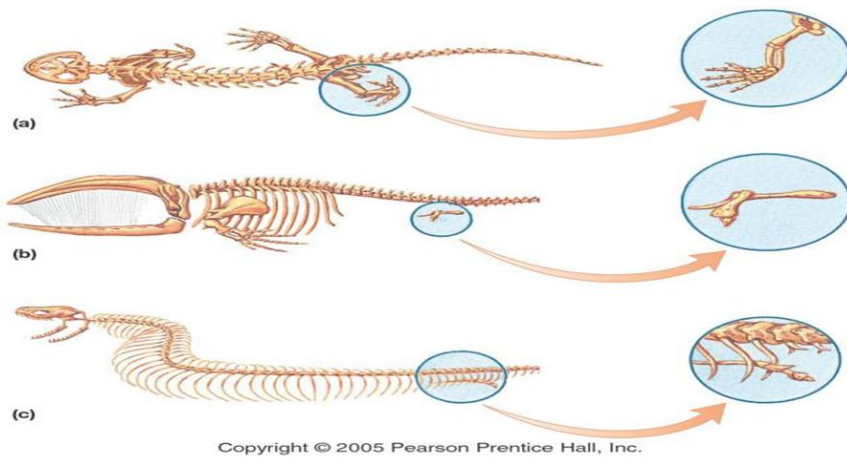


Analogous Structures:

These organisms **do not** share a recent common ancestor, but they have similar appendages that evolved to help them survive in an aquatic environment



vestigial structures



- Many organisms have vestigial structures that serve no apparent function. The (a) salamander, (b) whale, and (c) snake all inherited hindlimb bones from a common ancestor; the bones remain functional in the salamander but are vestigial in the whale and snake.