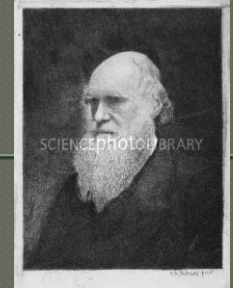


Evidence for Evolution

Charles Darwin 1809 - 1882



- Became known as the father of evolution.
- By the 19th century, the stage was set for Darwin's work.
- 5 year voyage of the HMS Beagle.
Textbook pg. 294
- His observations stimulated his curiosity which led to development of his theory.

Evidence for Evolution

- Recall: While visiting the Galapagos Islands, Charles Darwin made numerous observations that helped him formulate his theory of evolution
- Observations
 - Biogeography
 - Homologous and Analogous Features
 - Vestigial Features
 - Competition within Populations

Biogeography

- The scientific study of the geographic distribution of organisms based on both living species and fossils



Biogeography

Observations

● Unusual assortment of species found on Galapagos Islands

- Many species not found anywhere else
- Species bear a resemblance to species on the nearest continental land mass

● Unusual animal behaviour

- Many species show a lack of fear



Biogeography

Darwin's Explanation

- Remote oceanic islands became populated by species that arrived by water or air
- These species then evolved into new species over time
- These species could have evolved and lost their instinctive fear from living in a location with no natural predators

Biogeography

Specific Observations

Observations from the Galapagos Islands	Darwin's hypotheses regarding remote islands
many species of plants, birds, insects, and, in some cases, reptiles	Only these kinds of organisms are able to reach remote islands by crossing large expanses of open ocean.
no native amphibians and very few land mammals	Amphibians and most mammals are unable to cross open ocean and will not be found on remote islands.
many unique species found nowhere else on Earth	Over time, ancestral species have evolved into new geographically isolated species.
unique species most closely resemble species on the nearest continental land mass	Unique species are descendants of ancestral species from the nearest continental land masses and will exhibit some similarities.

Homologous Features

- A structure with a common evolutionary origin that may serve different functions in modern species

Human	1:TANSDT-----HLLQGQS-LTLTLESPPGSS-PSVQCRSPRGKNIQG
Monkey	1:TANSDT-----HLLGQS-LTLTLESPPGSS-PSVKCRSPGGKNIQG
Mouse	1:TFSPGT-----SLLQGQS-LTLTLDNSNKVSNPLTECKHK-KGKVVS
Rousette	1:NADLDTGSSSSSGSSSGSSSGSSI RLRP-GERLTLSESPPGVN-PSIVWESPGSKKYED
Cat	1:TAKVDP SGSGSSSS-STST-STS IYLLQGQSLTLTLESPPSSN-PSVQWKGPGNKSKSG
Dog	1:TAKWDS GSSS-----GSSNI RLLQGQQ-LTLTLENPSGSS-PSVQWKGPGNKSKHG
Rabbit	1:TANPNT-----RLLHGQS-LTLTLEGPSVGS-PSVQWKS PENKI IET
Pig	1:LTASVT-----RVLL-GQSLTLTLEGPSGSH-PTVQWKGPGNKSKND
▼	
Human	41:GKT-LSVSQLELQDSGTWT CTVLQN-QKKVEFKIDIVVLA
Monkey	41:GRT-ISVPQLERQDSGTWT CTVSQD-QKTVEFKIDIVVLA
Mouse	41:GSKVLSMSNLRVQDSDFWN CTVTLD-QKKNWFGMTLSVLG
▼	
Rousette	59:-KS-LSLTQLGRQESGTWE CIVSYN-KKTLVVKINIFVLA
Cat	58:VHS-LSLSQLELQESGTCT CTVSQS-QKTLVFNTNILVLA
Dog	50:GQN-LSLSWPQLQDGGTWT CIISQS-QKTVEFNINVLVLA
Rabbit	41:GPT-CSMPKLRQLQDSGTWS CHLSPQDQNKLELDIKIIVLG
Pig	41:VKS-LLLPQVGLSDGLWT CTVSQD-QKTLVFRSNI FVLA

Homologous Feature



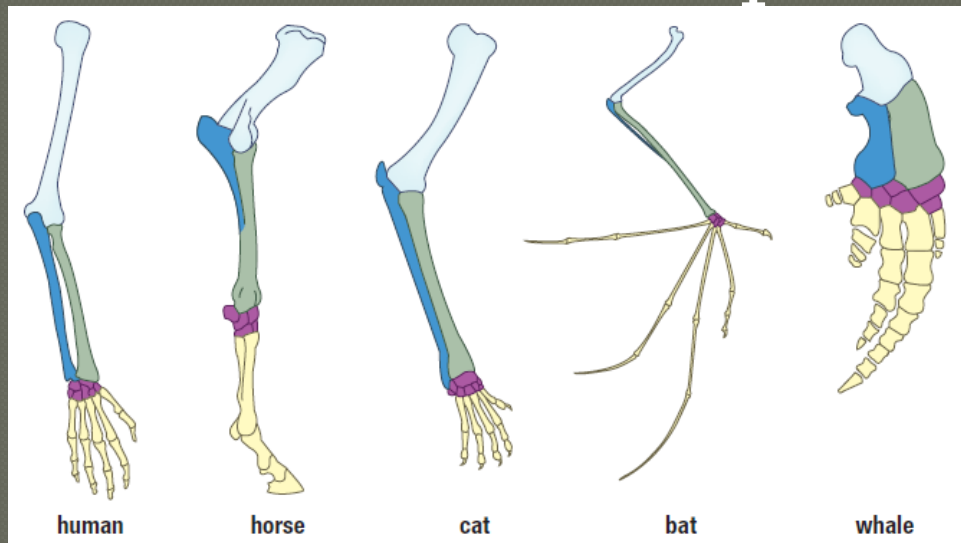
- The following organisms may look very different but they have more in common than meets the eye



Homologous Features

Observation

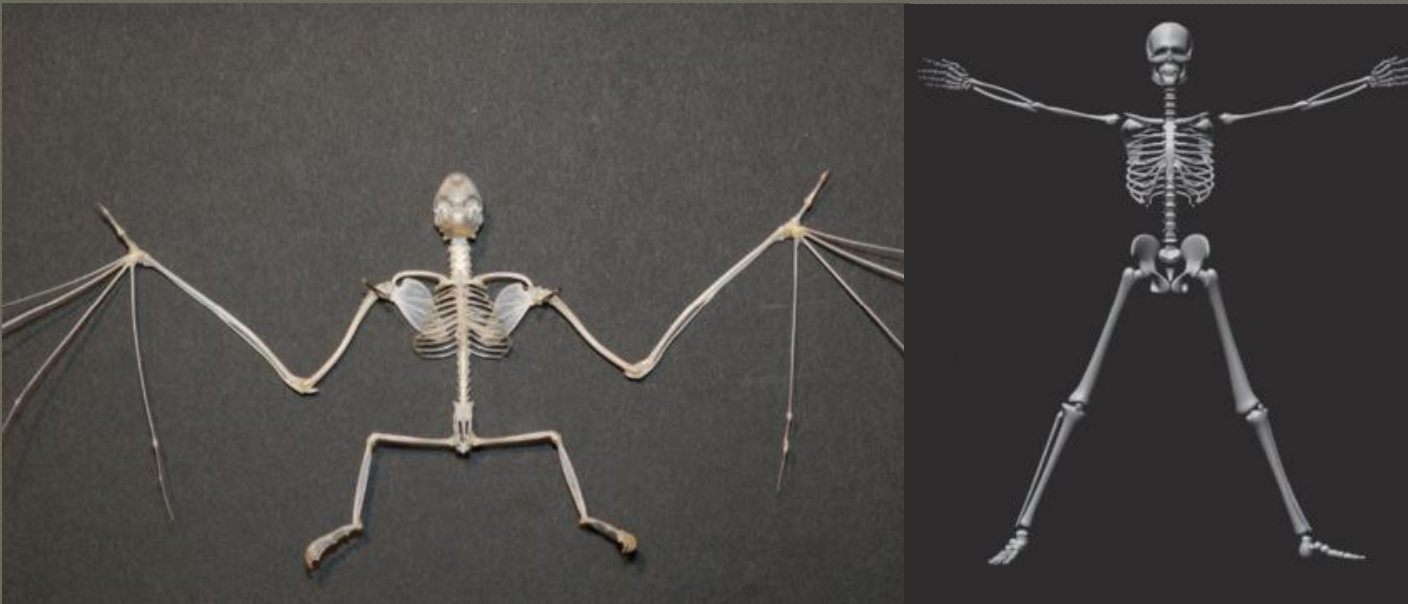
- Humans, moles, horses, porpoises, and bats all have limbs are constructed in a similar pattern that includes the same bones in the same relative positions



Homologous Features

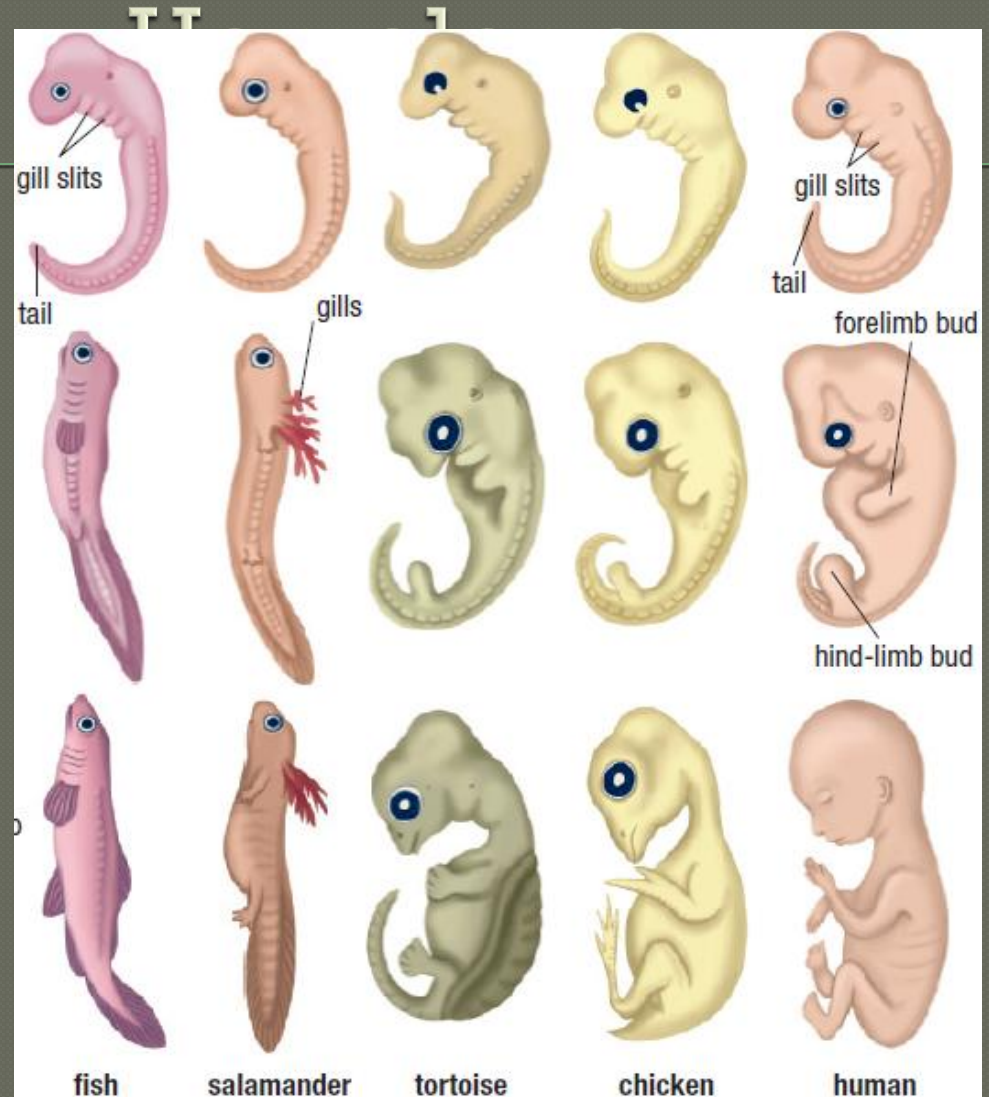
Observation

- Mammals have 28 skull bones and 7 neck bones, regardless of the size of their skull or length of their necks



Observation

- In early developmental stages, the embryos of all vertebrates share many homologous features including a short bony tail and gill slits

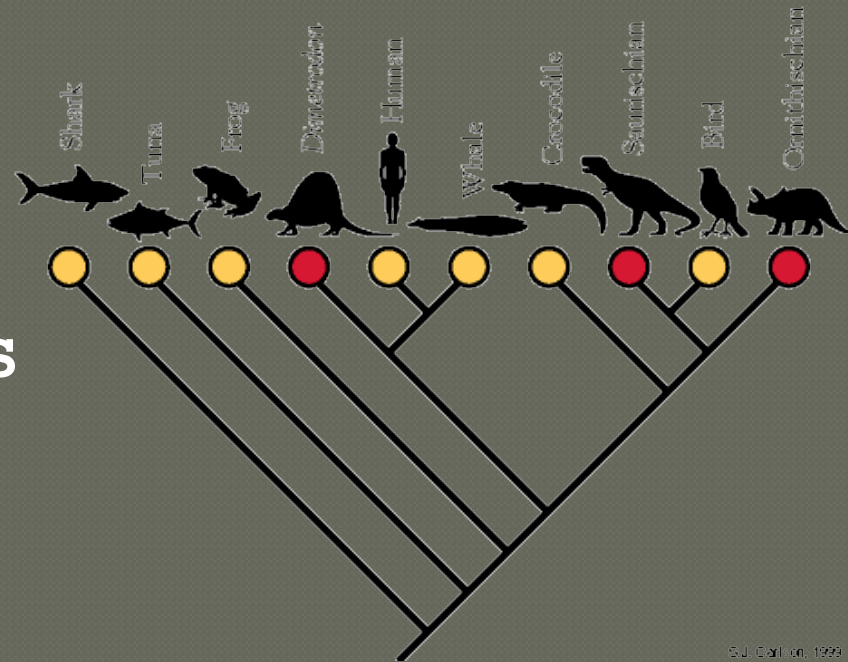


Homologous Features

Darwin's Explanation

- Closely related species have homologous features because they shared a common ancestor.

- Over time, the original structures were modified as each species evolved.



Analogous Features

- A structure that performs the same function as another but is not similar in origin or anatomical structure



Analogous Features

Observations

- Eyes and wings of flying insects serve the same function as the eyes and wings of flying birds yet they are completely different in structure

Darwin's Explanation

- Insects and birds are distantly related and have evolved these features independently of each other

Vestigial Features

- Rudimentary and non-functioning, or only marginally functioning, structure that is homologous to a fully functioning structure in closely related species



Vestigial Features

Observation

- Cave fish have eye sockets but have either tiny vestigial eyes or no eyes



Vestigial Features

Observation

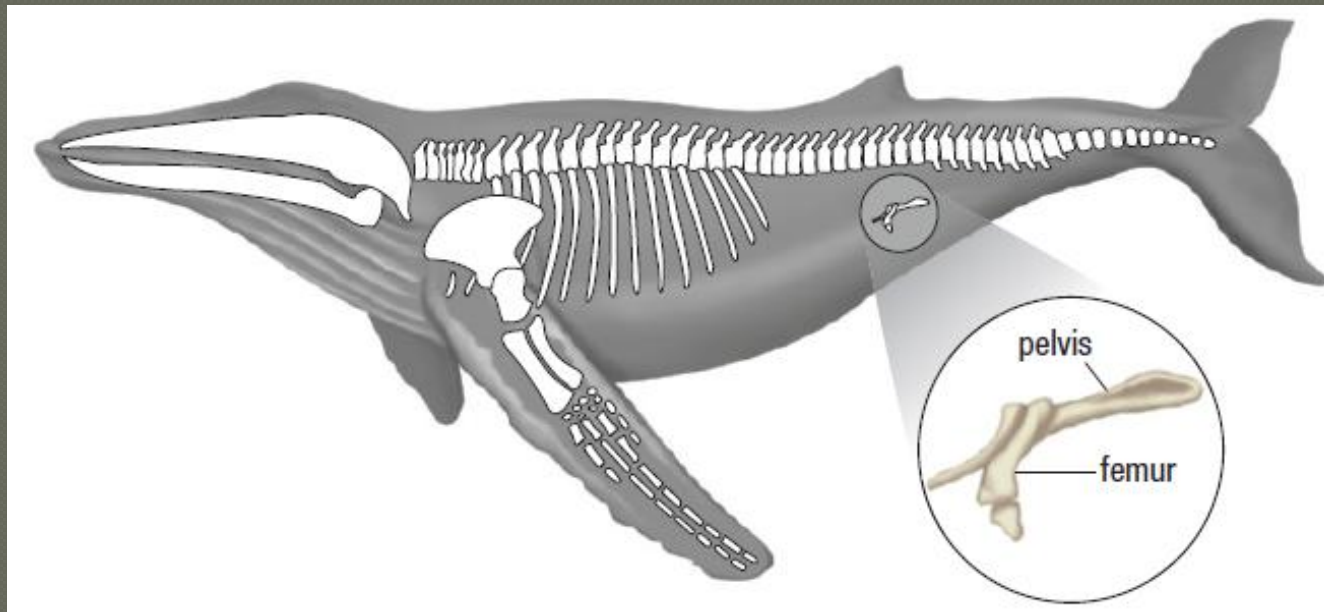
- Some mammals have vestigial toes
 - Dogs
 - Pigs
 - Horses



Vestigial Features

Observations

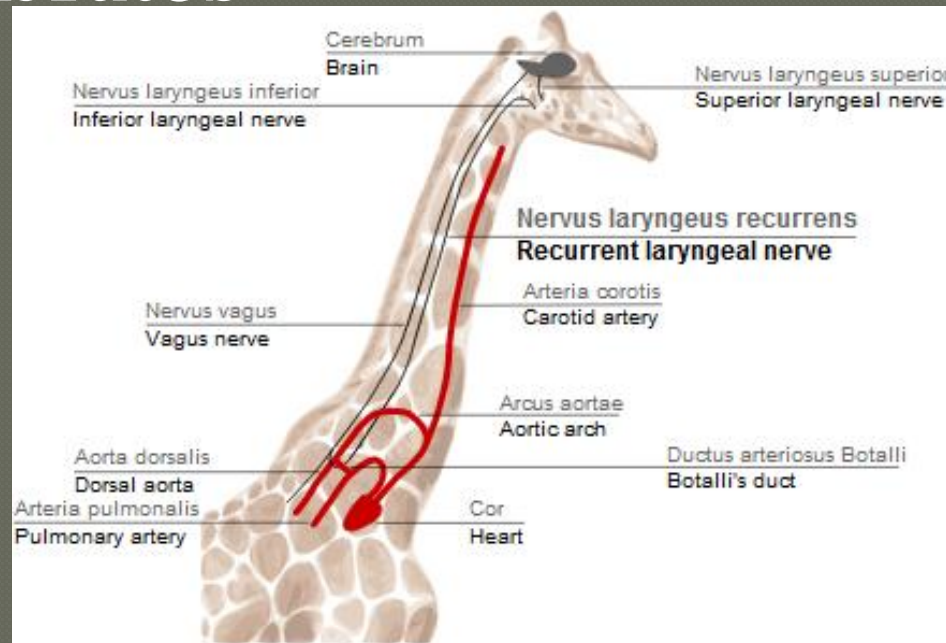
- Some land birds have webbed feet
- Some snakes and whales have vestigial hip bones



Vestigial Features

Observation

- Similar pathway of a nerve in vertebrates



Vestigial Features

Darwin's Explanation

Suggests an evolutionary past – in an ancestor it must have been useful but became useless as the species evolved.
(evolutionary baggage)

Competition within populations

Observations

- Thomas Malthus showed that all populations were limited in size by their environment
 - Populations do not grow exponentially
 - More offspring produced than can survive
- Whatever the conditions, populations could not continue to grow indefinitely
- This results in competition for survival between members of the same species

Competition within populations

Darwin's Explanation

- The environment might be favoring certain individuals as a result of the competition for survival



Questions

- Answer #1 – 4 on Textbook pg. 303