NOTES – 6.3

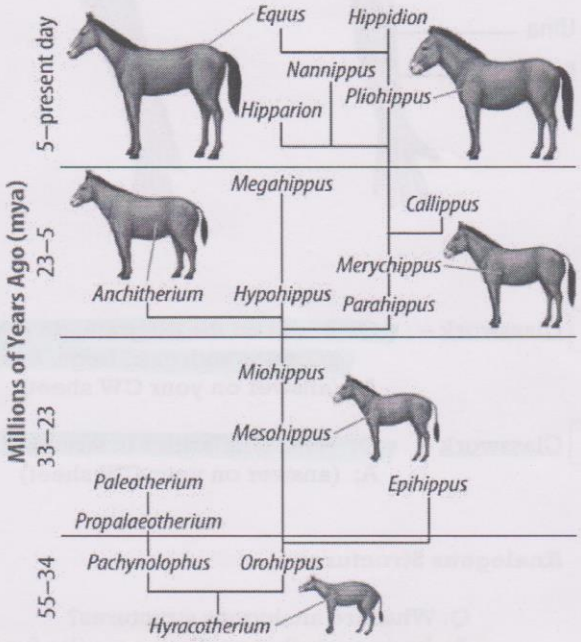
Chapter 6 – The Environment and Change Over Time
Lesson 3 – Biological Evidence of Evolution

Evidence for Evolution

Modern-day organisms can provide clues about evolution.

By comparing organisms, scientists can infer how closely related the organisms are in an evolutionary sense.

Scientists compare similarities in – body structures, development before birth, and DNA sequences to determine the evolutionary relationships among organisms.



1 Classwork –

Q: Which animals, from the following list would you group together based on their similarities?

- horse
- rabbit
- squirrel
- donkey
- mouse
- chipmunk
- deer
- zebra

A: (answer on your **CW** sheet)

Comparative Anatomy

Q: What is comparative anatomy?
A: the study of similarities and differences among structures of living species

An organism's body structure is its basic body plan, such as how its bones are arranged.

Ex. fishes, amphibians, reptiles, birds, and mammals all have a similar body structure – an internal skeleton with a backbone

This is why scientists classify all 5 groups of animals together as vertebrates.

Presumably, these groups all inherited these similarities in structure from an early vertebrate ancestor that they shared, also known as homologous structures.

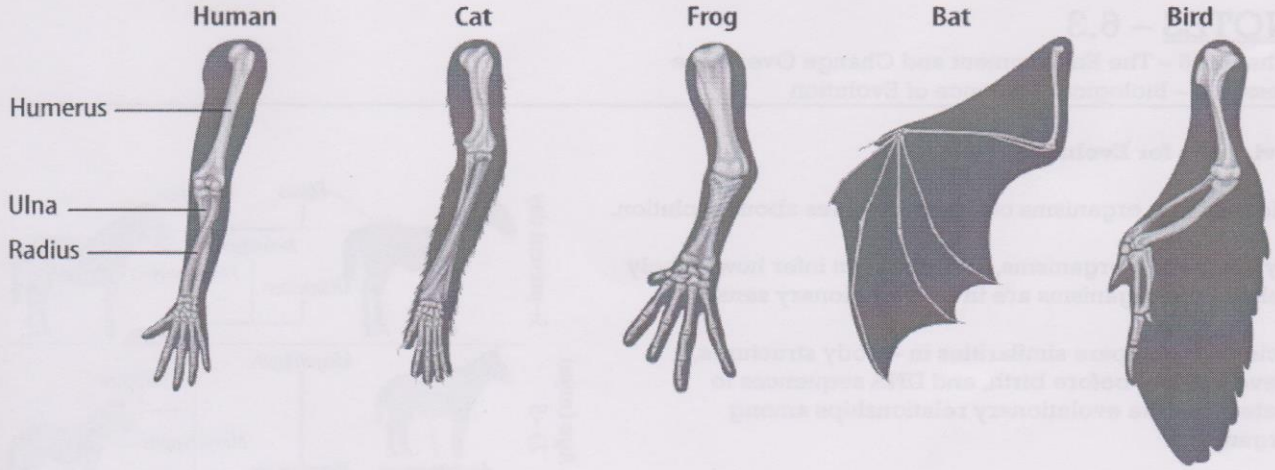
Q: What are homologous structures?
A: similar structures that related species have inherited from a common ancestor

Sometimes scientists find fossil evidence that supports the evidence provided by homologous structures.

Ex. fossils show that the ancestors of today's whales had legs and walked on land known as creodonts (seen in the video clip!)

This supports other evidence that whales and humans share a common ancestor.

2 Classwork – Q: What information do homologous structures reveal?
A: (answer on your **CW** sheet)

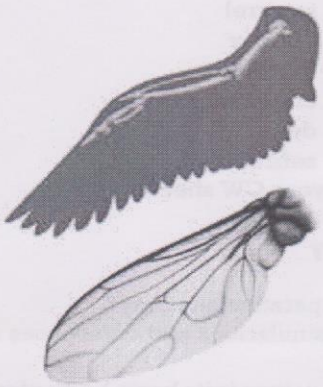


3 Classwork – Q: Based on the diagram, do you think that humans share a common ancestor with cats, frogs, bats, and birds?
A: (answer on your **CW** sheet)

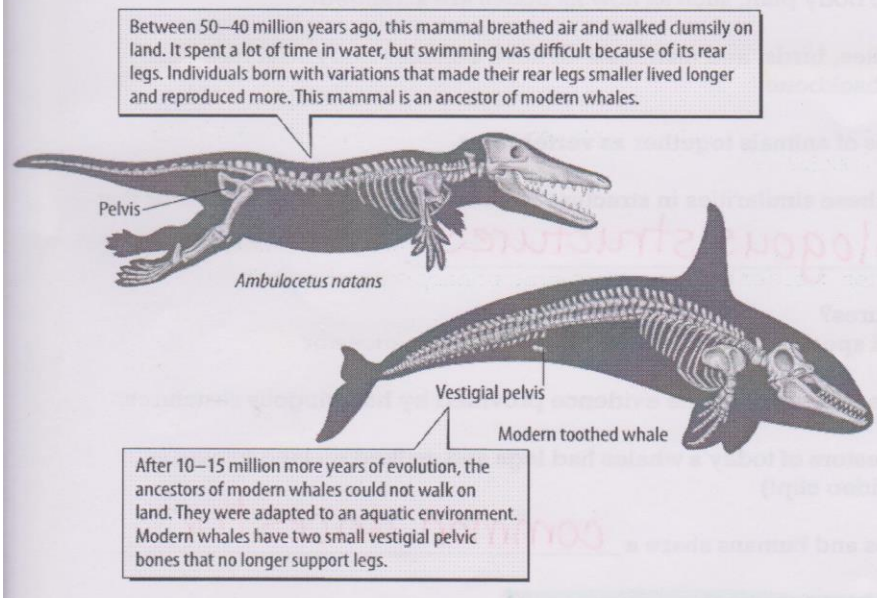
4 Classwork – Q: What similarities in structure do the above forelimbs share?
A: (answer on your **CW** sheet)

Analogous Structures

Q: What are analogous structures?
A: body parts that perform a similar function but differ in structure



Vestigial Structures

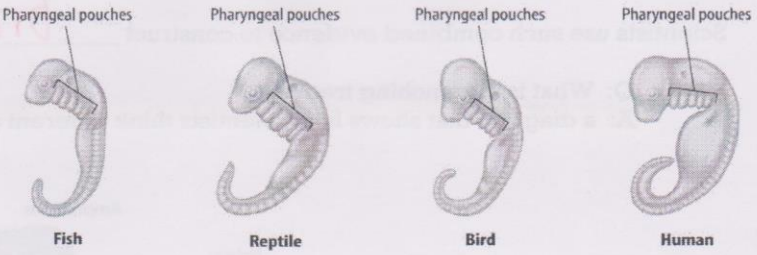


Q: What are vestigial structures?
A: body parts that have lost their original function through evolution

The best explanation is that the species with a vestigial structure is related to an ancestral species that used the structure for a specific purpose.

Similarities in Early Development

Scientists can also make inferences about evolutionary relationships by comparing the early development of different organisms.



Ex. a fish, a bird, a reptile and a human look quite different however, during early development these 4 organisms go through similar stages.

These similarities suggest that these 4 vertebrate species are related and share a common ancestor.

Similarities in DNA

Scientists infer that species with similar body structures and development patterns inherited many of the same genes from a common ancestor.

Recall that genes are made of DNA and by comparing the sequence of nitrogen bases in the DNA of different species, scientists can infer how closely related the species are.

The more similar the sequences, the more closely related the species are. Recall also that the DNA bases along a gene specify what type of protein will be produced.

Thus, scientists can also compare the order of amino acids in a protein to see how closely related two species are.

Recently, scientists have developed techniques that allow them to extract, or remove, DNA from fossils.

The DNA from fossils has provided new evidence about evolution.

5 Classwork – Q1: What can scientists learn from fossil DNA that they could not learn by studying the physical structure of fossils?

A1: (answer on your **CW** sheet)

Q2: Will the ability to extract DNA from fossils mean that scientists will no longer have to compare living species in order to reconstruct evolutionary relationships?

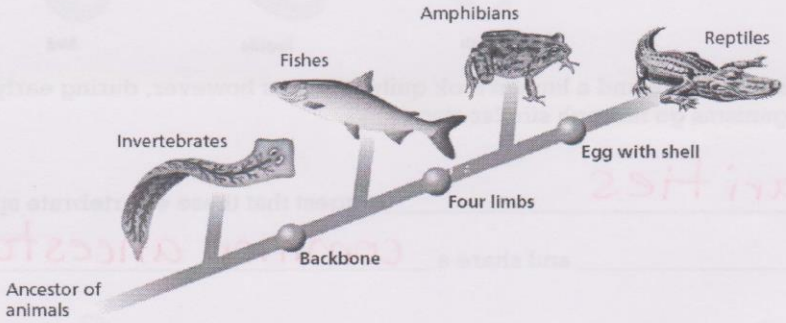
A2: (answer on your **CW** sheet)

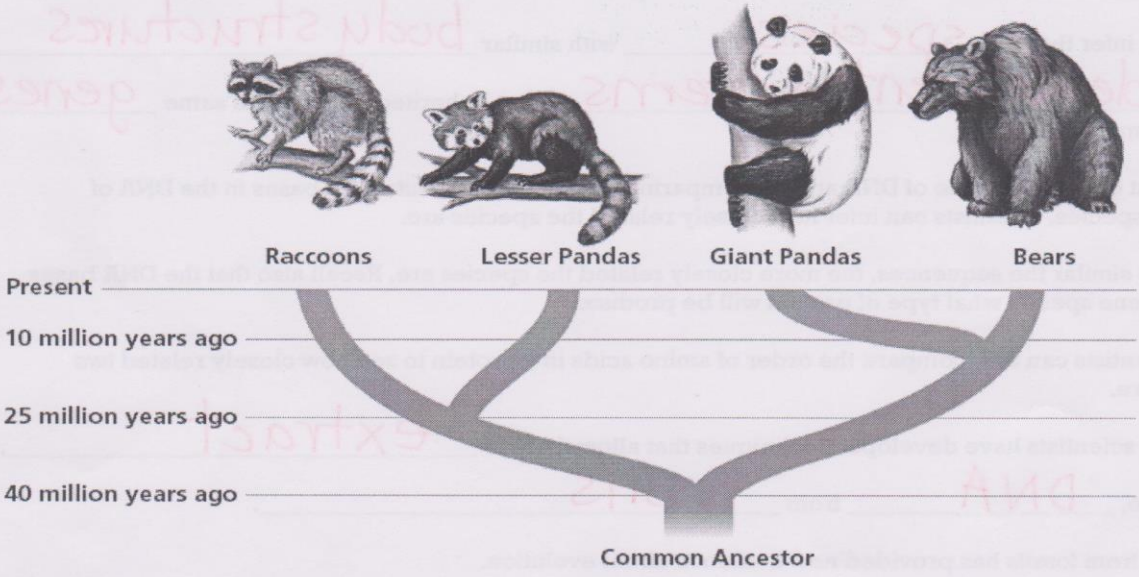
Scientists have combined evidence from fossils, body structures, early development, and DNA and protein sequences to determine the evolutionary relationships among species.

In most cases, DNA and protein sequences have confirmed conclusions based on earlier evidence.

Scientists use such combined evidence to construct branching trees.

Q: What is a branching tree?
A: a diagram that shows how scientists think different groups of organisms are related





6 Classwork – Q1: Are giant pandas more closely related to lesser pandas or to bears?
A1: (answer on your **CW** sheet)

Q2: When did giant pandas and bears evolve from their common ancestor?
A2: (answer on your **CW** sheet)

Q3: When did raccoons and lesser pandas evolve from their common ancestor?
A3: (answer on your **CW** sheet)

Q4: Which are more closely related, raccoons and lesser pandas, or giant pandas and bears?
A4: (answer on your **CW** sheet)

7 Classwork – Lesson 3 Review p. 169 (answer on your **CW** sheet)