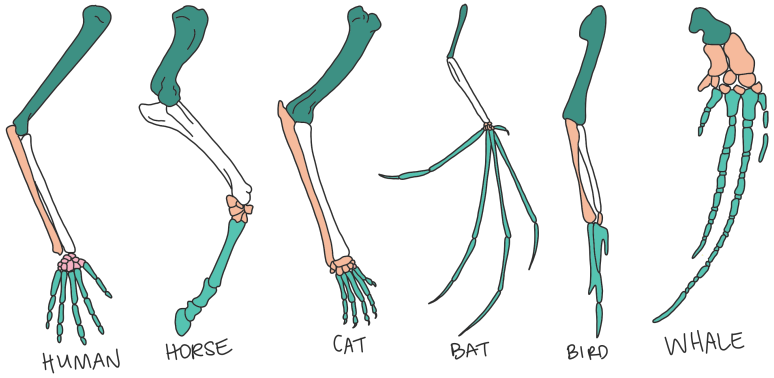
HOMOLOGOUS STRUCTURES

Name: _____

Complete the questions below about homologous structures.

Homologous structures are anatomical features found in different organisms that suggest a shared ancestry. Despite having different functions, these structures exhibit similar underlying structures. They can be observed at various levels, including organs, bones, and genes. Homologous structures provide evidence of divergent evolution, where different species have evolved from a common ancestor and inherited certain traits from their shared lineage.

A classic example of homologous structures is the forelimbs of vertebrates. Despite being used for different purposes such as walking, flying, or swimming, the forelimbs of humans, bats, cats, and whales possess a common arrangement of bones. This similarity in structure supports the theory of evolution and highlights the shared ancestry between these species. By studying homologous structures, scientists can gain insights into evolutionary relationships, adaptions to different environments, and the gradual changes that have occurred over time.



1. What is a homologous structure?

2. What is the significance of the underlying structure being similar in homologous structures, even though their functions may differ?

3. How do homologous structures provide evidence for evolutionary relationships between species?

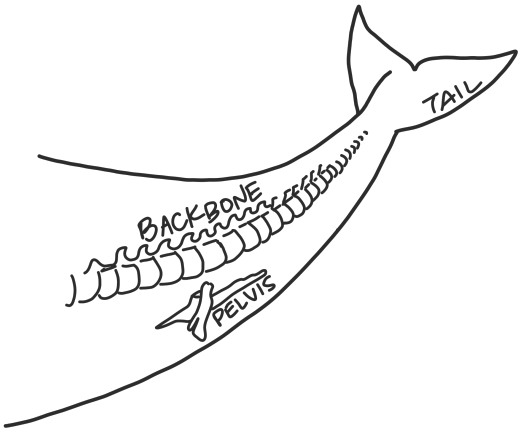
4. When identifying homologous structures, scientists sometimes notice that similar structures are used for different purposes. Pick two from the model above and explain the different adaptations using environmental evidence.

VESTIGIAL STRUCTURES

Name: _____

Complete the questions below about the vestigial structures.

Vestigial structures are anatomical features in organisms that have lost or reduced their original function over the course of evolution. These structures were likely functional in ancestral species, but due to changes in the organism's environment or behavior, they are no longer necessary or useful. Vestigial structures are considered remnants of evolutionary history and provide evidence for the theory of evolution. They demonstrate that organisms have evolved from ancestors with different traits and adaptations. These structures may serve as a record of evolutionary changes and can provide insights into an organism's evolutionary lineage. The presence of vestigial structures supports the idea of common ancestry and the gradual process of evolution.



1. What is a vestigial structure?

2. How might the study of vestigial structures contribute to our understanding of the evolutionary history of organisms?

3. What are some challenges in identifying vestigial structures and determining their original functions?

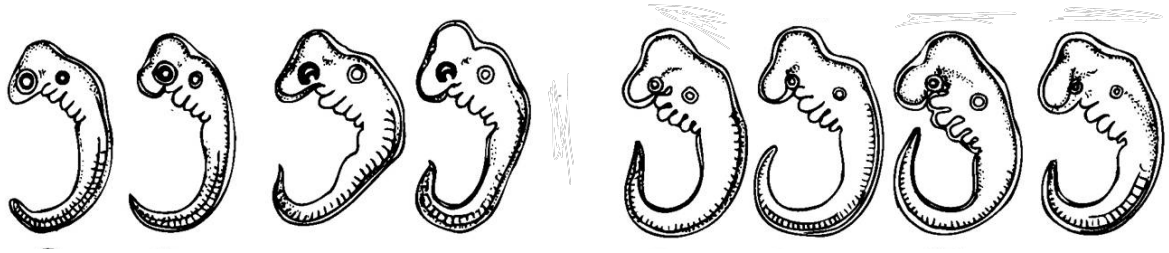
4. Do you think vestigial structures can disappear completely over time? Why or why not?

5. Can you think of examples of vestigial structures in humans? What is its function, and why is it considered vestigial?

EMBRYOLOGY

Name: _____

Complete the questions below about embryology.



Fish Salamander Tortoise Chicken Pig Calf Rabbit Human

Embryology is a fascinating field that explores the intricate processes and transformations that occur during the early stages of life. This branch of biology focuses on the development of embryos, from fertilization to the formation of a complete organism. Many species share similar features and structures during the early stages of development. For example, the embryos of fish, reptiles, birds, and mammals all possess gill slits and tails at some point. These similarities suggest that these organisms are following a shared developmental program inherited from a common ancestor.

1. What is embryology?

2. Identify two similarities between the embryos pictured above that might lead to the conclusion that these are all related species.

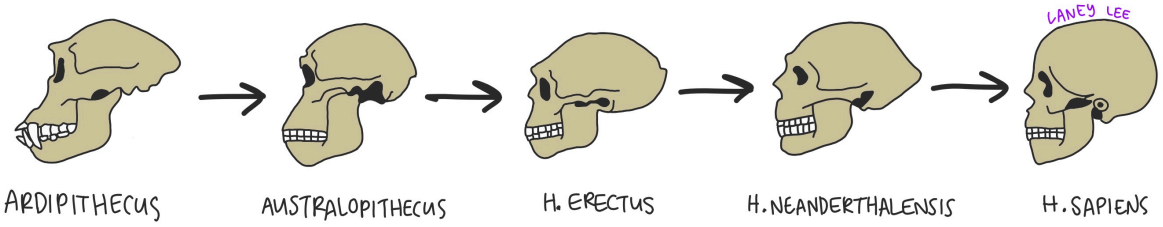
3. How do similarities in development provide evidence for similar DNA?

4. Do you agree that similarities in embryos may provide evidence for evolution? Why or why not?

HUMAN FOSSILS

Name: _____

Complete the questions below about human fossils.



The fossil record traces the evolutionary journey from Ardipithecus to Homo sapiens, representing the development of hominin species over millions of years. Ardipithecus, Australopithecus, Homo habilis, Homo erectus, and Homo neanderthalensis are key stages in this progression. Fossils reveal the transition from ape-like to human-like features, advancements in tool-making, migration out of Africa, adaptations to various environments, and the emergence of anatomically modern humans. The fossil record provides evidence for the gradual evolution of our species and the development of complex behaviors and cultural practices.

1. Identify the similarities and differences between the fossils pictured above.

2. What was the biggest change in skull anatomy between the Ardipithecus and the Homo sapien?

3. You are a scientist examining the fossils above. Would you conclude that these species are related? Why or why not?

4. What can the fossil record tell us about the environmental factors and adaptations that influenced the evolution of hominin species over time?

5. Do fossils provide evidence for evolution? Why or why not?

FOSSILS

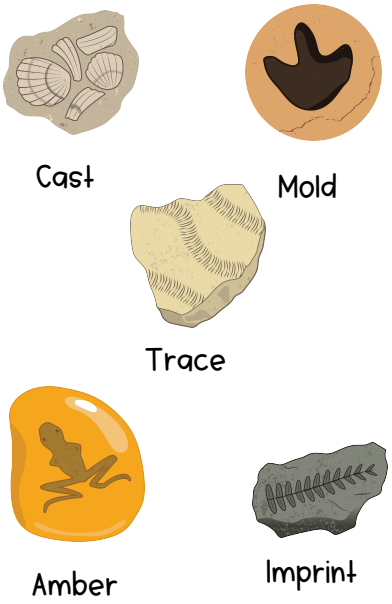
Name: _____

Complete the questions below about fossils.

Fossils are the preserved remains or traces of ancient organisms that provide evidence of past life on Earth. They are typically found in sedimentary rocks, where the process of fossilization occurs over millions of years. Fossils can include the remains of plants, animals, and other organisms, as well as tracks, burrows, and other traces of ancient life. Fossilization begins when an organism dies and is quickly buried by sediment, such as mud or sand. Over time, the sediment layers accumulate and apply pressure on the remains, which can lead to the preservation of hard parts like bones, shells, teeth, or wood. By examining fossils, scientists can learn about the anatomy, behavior, and evolution of ancient organisms. Fossils can also provide insights into past environmental conditions and help reconstruct ecosystems that existed long ago.

There are 5 different types of fossils.

- Petrified fossils are formed when the organic material of an organism is replaced by minerals, resulting in the preservation of the organism's structure.
- Mold and cast fossils are an organism decomposes or dissolves after burial, it can leave behind an impression or mold in the surrounding sediment. If the mold gets filled with minerals, it forms a cast fossil, which is a replica of the original organism.
- Trace fossils are indirect evidence of ancient life and include tracks, footprints, burrows, and feces.
- Amber fossils are insects, small animals, or plant parts can become trapped in sticky tree resin, which hardens over time to form amber.
- Imprints and impressions are formed when an organism leaves behind an imprint or impression on a surface, such as a leaf pressed into sediment or a feather imprinted in rock.



1. What is a fossil? Explain how fossils are formed.

2. There are 5 different types of fossils. Describe each type.

3. What can fossils tell us about the past on Earth?

4. What could be some challenges and limitations of studying fossils?

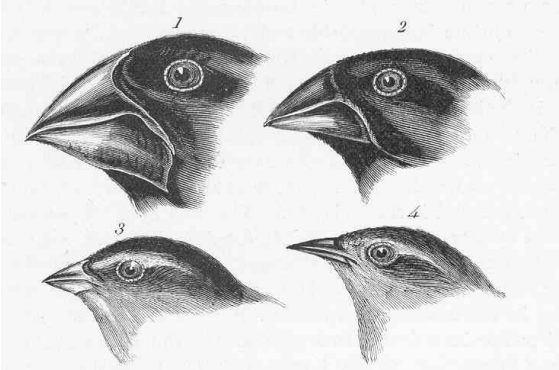
CHARLES DARWIN'S FINCHES

Name: _____

Complete the questions below about Charles Darwin's Finches.

Charles Darwin's study of finches' beaks in the Galapagos Islands was a significant observation during his voyage on the HMS Beagle in the 1830s. Darwin noticed that there were multiple species of finches on different islands of the Galapagos, each with distinct beak shapes and sizes.

This observation played a pivotal role in Darwin's formulation of the theory of evolution by natural selection. He proposed that variations within a population, such as variations in beak shape, could lead to differential survival and reproduction. Over time, those individuals with traits that are better suited to their environment would be more likely to pass on their genes to future generations, resulting in evolutionary changes within a species.



1. What were Charles Darwin's key observations about the Galapagos Islands finches?

2. How could Darwin's observations of the finches' beak variations relate to their…
   A. Niches:

   B. Food Sources:

3. How can natural selection explain the variations in the finches' beaks?

4. Adaptive radiation is described as a common ancestor that gives rise to multiple species that adapt to different ecological niches. Can you think of another example of this?