Name: _____ Date: _____ Period: _____

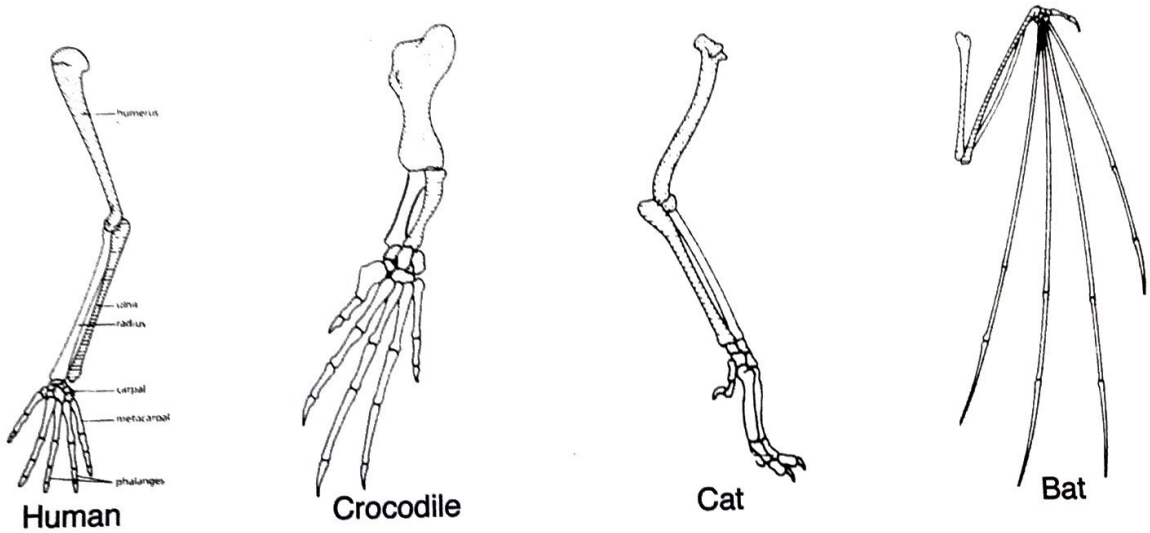
Evidence for Evolution Wk #: _____

The similar anatomy and development of animals suggest that they are related to each other. This is evidence that living creatures have evolved, or gradually changed over time. In this activity, you will learn about homologous structures, vestigial structures, embryology, and DNA to determine their value as evidence for evolution.

Homologous Structures

There are many examples of body structures that are formed in similar ways during embryonic development and that share similar patterns of bone structure, even though they take on different forms and perform somewhat different functions. These structures are called **homologous structures**. *Homo-* means same, and *-logous* means information, so *homologous* means "same information".

Use 6 different colors for similar bones in the organisms.



Organism	Function of Limb
Human	
Crocodile	
Cat	
Bat	

1. How do homologous structures provide evidence for evolution, or change over time?

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6. Examine Stage 2 of the embryos. Which two embryos begin to develop characteristics most different from that of a human?

7. Compare the organisms at Stage 3. By this point in development, they all have unique characteristics. When compared to the human, explain the differences in each of the following:

Organism	Difference
fish	
turtle	
chick	
hog	
rabbit	

8. Use the diagram of embryos to explain the similarities and differences observed in the embryos of many vertebrates and how this idea of comparative embryology supports evolution.

Molecular Biology- DNA

All living cells use information coded in DNA and RNA to carry information from one generation to the next and to direct protein synthesis. This genetic code is nearly identical in almost all organisms, including bacteria, yeast, plants, fungi, and animals. This is powerful evidence that all organisms evolved from common ancestors that shared this code. Molecular homologies can be used to infer relationships among organisms. The diagram below shows a small portion of DNA for the same gene, *Hoxc8*, in three animals- a mouse, a baleen whale, and a chicken.

Organism	Sequences of Bases in Section of *Hoxc8*
mouse	CAGAAATGCCACTTTTATGGCCCTGTTTGTCTCCCTGCTC
baleen whale	CCGAAATGCCTCTTTTATGGCGCTGTTTGTCTCCCTGCGC
chicken	AAAAAATGCCGCTTTTACAGCTCTGTTTGTCTCTCTGCTA

9. What percentage of the nucleotides in the baleen whale's DNA are different from those of the mouse?

10. What percentage of the nucleotides in the chicken are different from those of the mouse?

11. Predict if a mouse is more closely related to a baleen whale or to a chicken? Explain your answer.

12.How do scientists use small sections of DNA, like the ones shown here, as evidence for evolution?

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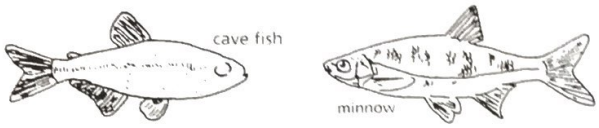
Vestigial Structures

There are also many examples of body structures in animals that show gradual changes over time. In some cases, these changes have reduced or removed the function of some body parts and organs. These reduced or lost structures are called **vestigial structures**. The wings of penguins and the leg bones of snakes are examples of this phenomenon. The two fish below, the cave fish and the minnow, are related to each other, but the cave fish is blind and only has the remnants of eyes.



2. Explain why eyesight is not an important adaptation to life in a deep sea cave.

3. How does the cavefish and the minnow suggest a common ancestry?

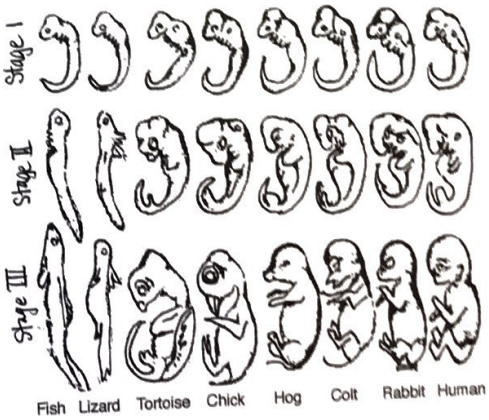
4. How do vestigial structures indicate that present day organisms are different from their ancestors?

Review the list of vestigial structures, suggest possible functions for each structure, and predict why they are now considered to be vestigial.

Structure	Probable Function	Why Vestigial?
human wisdom teeth		
wings on an ostrich		
legs on snakes		
femur in whale		

Embryology

Researchers noticed a long time ago that the early developmental stages of many animals with backbones, or vertebrates, look very similar. Evolutionary theory offers the most logical explanation for these similarities in patterns of development. Similar patterns of embryological development provide further evidence that organisms have descended from a common ancestor.



5. Examine Stage I of the embryos. What can you conclude about the early stages of embryological development?