

Evolution 1: Evidence of Evolution lab

NAME:

Fossils: Study the figure at right to answer the following questions

- 1. Which rock layer is the oldest?_____
- 2. Which rock layer is the youngest? _____
- 3. Explain what can scientists learn about evolution when comparing different fossils in different rock layers? You must write at least two complete sentences. (Use terms like relatedness, extinction, etc.)



Darwin's Observations

Observation #1: Organisms are well suited to their particular environments.

List 2 features that make of the second seco	chimps and camels well suited to their environments.
a	b
c	d
e. What does it mean for a species to be well s	uited to its environment?

f. What might happen to an individual or species if the environment changes? _____

Observation #2: Fossils of extinct species resemble organisms alive today.





a. What modern species does Eohippus resemble?

b. What may have caused fossilized species to go extinct?

c. How might fossilized species be related to living species?



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Observation #3: The Galapagos Islands are very diverse, especially in climate. The

characteristics of animals living there differ by island as well.

Using the example of the Galapagos tortoises (pg. 452, Fig. 16-2), explain why the tortoises shells vary (differ) by island.

Comparing Amino Acid Sequences in Vertebrate Proteins

- The chart below shows the amino acids found in one protein (hemoglobin) of different vertebrates.
- Count the number of molecules of each amino acid for humans and record the total in the chart below. Count and record the number of amino acids for each other animal.

Data Table 1:

Primate	Human	SER	THR	ALA	GLY	ASP	GLU	VAL	GLU	ASP	THR	PRO	GLY	GLY	ALA	ASN	ALA	THR	ARG	HIS
	Chimpanzee	SER	THR	ALA	GLY	ASP	GLU	VAL	GLU	ASP	THR	PRO	GLY	GLY	ALA	ASN	ALA	THR	ARG	HIS
	Gorilla	SER	THR	ALA	GLY	ASP	GLU	VAL	GLU	ASP	THR	PRO	GLY	GLY	ALA	ASN	ALA	THR	LYS	HIS
	Baboon	ASN	THR	THR	GLY	ASP	GLU	VAL	ASP	ASP	SER	PRO	GLY	GLY	ASN	ASN	ALA	GLN	LYS	HIS
	Lemur	ALA	THR	SER	GLY	GLU	LYS	VAL	GLU	ASP	SER	PRO	GLY	SER	HIS	ASN	ALA	GLN	LYS	LEU
Non- Primate	Dog	SER	SER	GLY	GLY	ASP	GLU	ILU	ASP	ASP	THR	PRO	SER	ASN	LYS	ASN	ALA	ALA	LYS	LYS
	Chicken	GLN	THR	GLY	GLY	ALA	GLU	ILU	ALA	ASN	SER	PRO	GLU	THR	LYS	ASN	SER	GLN	ARG	ALA
	Frog	ASP	SER	GLY	GLY	LYS	HIS	VAL	THR	ASN	SER	ALA	HIS	ALA	LYS	ASN	ALA	LYS	ARG	ARG

Data Table 2:

Number of Molecules of Different Amino Acids in Vertebrates									
Amino Acid	Abbreviation	Human	Chimp	Gorilla	Baboon	Lemur	Dog	Chicken	Frog
Alanine	ALA-								
Argenine	ARG-								
Asparagine	ASP-								
Aspartic acid	ASN-								
Glutamine	GLU-								
Glutamic acid	GLN-								
Glycine	GLY-								
Histidine	HIS-								
Isoleucine	ILU-								
Leucine	LEU-								
Lysine	LYS-								
Proline	PRO-								
Serine	SER-								
Threonine	THR-								
Valine	VAL-								



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Data Table 3: Similarities and differences in the amino acid sequences of a protein (hemoglobin) - Going from left to right in table 1, look at the position of each amino acid. Count the number of similarities *in position* of that organism as compared to a human. (Remember, the more amino acid sequences in common, the more closely related the animals!!)

	Number of Similar Amino Acid Positions	Number of Different Amino Acid Positions
	between human and	between human and
Chimpanzee		
Gorilla		
Olive Baboon		
Lemur		
Dog		
Chicken		
Frog		

Analyzing your Observations:

- 1. From your observations in table 3, which primate is most closely related to the human being? ______
- 2. Which primate is least closely related? ______
- 3. From your observations in table 3, which non-primate is most closely related to the human being?

4. Which non-primate is least closely related to the human? ______

5. What does it mean when two organisms have the same amino acid sequences in the same place? _____

Comparative Anatomy

The idea that ancestral structures have been reused in descendants is called homology. Homology is another major piece of evidence for evolution. Homologous structures are structurally similar although they perform different functions. Evolution is the explanation for the existence of common structures in otherwise unrelated species.

 Carefully examine the drawings of the bones in Figure 1 on the next page. Look for similarities among the various animals. Color each bone of the human arm a different color. All bones of the wrist (carpals) should be a single color, and the bone groups of the hand (metacarpals and phalanges) should be another color. Then color the corresponding bones (containing the same pattern) in each of the other animals the same color as the human bone (i.e. if you color the humerus blue in the human, it should be blue in all the other animals).



2. Based on the limbs, which two animals do you think are most closely related? Provide evidence for your prediction.

3. a. Pick one bone. ____

b. How has the bone you picked been adapted for new purpose in these vertebrates? Use two examples in your answer. Explain the function of the bone in each animal and how has the bone been modified to help with this function.

4. Use pages 468-469 to describe the differences between homologous structures and analogous structures. Make sure to include an example of each type in your description.

5. How does comparative anatomy provide evidence for evolution?