**EVIDENCE OF EVOLUTION LAB STATIONS NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**7A - analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental
7B - analyze and evaluate scientific explanations concerning any data of sudden stasis, and sequential nature of groups in the fossil record
INTRODUCTION**

1. **Evolution-**
2. **Biogeography-**

**5. Analogous Structures-**

1. **Vestigial Structure-**
2. **Homologous Structures**

**INSTRUCTIONS**🡪Complete each station in the allotted time by reading the instructions, answering the questions, and completing the actions. Please raise your hand if you and your partner are stuck. All incomplete stations will be your responsibility to finish in tutorials.

**EVIDENCE TYPE 1 – FOSSIL EVIDENCE**

1. Fossil Record is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Newer Fossils**

1. Gradualism- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Punctuated equilibrium\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **Card Sort:** Write the correct order of the samples from oldest (bottom

layer) to newest (top layer) on the right using the timeline.

 **Station Summary**

At this station I learned\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Older Fossils**

**EVIDENCE TYPE 2: BIOGEOGRAPHY**

* + - 1. Biogeography is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			2. Pangea is a\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and it existed during the Paleozoic era (A really really long time ago) and eventually drifted apart and is separated by oceans because of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
			3. Fossil evidence for Pangaea includes the presence of similar and identical species on continents that are now great distances apart or separated by oceans.
				1. Where do you find the fossil remains of the Triassic land reptile *Lystrosaurus*?

You can find the fossil remains of the Triassic land reptile on the continents of \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* + - * 1. Make a conclusion using the sentence stem below on when the *Lystrosaurus* first existed on the planet…before Pangea split or after?

The Lystrosaurus existed on the planet \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(before/after) Pangea split. I believe this to be true because\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* + - 1. Biogeography can also be used to determine common ancestry of living species. Look at the species of camel in Figure 2. Describe their similarities and differences and how their environment has effected that.
				1. The camels are similar because\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The camels are different because\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Their environment and location effected how the camels evolved because\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

BIOGEOGRAPHY CARD SORT – The cards here show the evolution of species A, B, C, D, and E as the original island broke apart. As the populations were separated, they each adapted to their separate environment. Arrange the cards in order of how this process must have occurred and write the order below:

🡪

**EVIDENCE TYPE 3: MOLECULAR HOMOLOGIES**

1. Molecular Homologies are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Cytochrome C is a protein that can help us figure out how closely related species are to each other by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Two species with very few differences in their Cytochrome C amino acid sequence are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (closely or not closely) related.
4. Using the table below: Circle the differences in amino acid sequences to analyze the evolutionary relationship between the human, the kangaroo, and the bullfrog

|  |  |  |
| --- | --- | --- |
|  | **Comparison between Kangaroo and human** | **Comparison between human and bullfrog** |
| *Circle the Amino Acids where there is a difference between the two species.* | **Kangaroo****ASP****VAL****GLU****LYS****LYS****VAL****GLN****ALA****VAL** | **Human****ASP****VAL****GLU****LYS****LYS****IIL****MET****SER****VAL** | **Human****ASP****VAL****GLU****LYS****LYS****IIL****MET****SER****VAL** | **Bullfrog****ASP****VAL****GLU****LYS****LYS****VAL****GLN****ALA****CYC** |
| **Number of amino Acid Differences** |  |  |

1. The human and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have fewer A.A. differences and therefore are closely related and have a recent common ancestor.

**EVIDENCE TYPE 4: HOMOLOGOUS STRUCTURES**

**Part A:**

1. Homologous structures are defined as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Homologous structures indicate divergent evolution which is when \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Analogous Structures are defined as\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Analogous structures indicate convergent evolution which is when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. An example of convergent evolution is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. What is the function of each of the following structures (Use your own knowledge)
	1. Human arm –
	2. Whale fin –
	3. Lizard leg -
	4. Bird wing -
7. Carefully examine the drawings of the bones in figure 1. What are the similar structures (bones) found in each of the limbs?
8. A shark is a fish, and a dolphin is a mammal, but their fins serve similar functions. How does this describe convergent evolution?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**CARD SORT 🡪 Use the cards provided to make two piles, one with analogous structure examples and the other with homologous structures. Use the chart for reference.**

 **Have your teacher check and stamp here🡪**

**EVIDENCE TYPE 5: DEVELOPMENTAL HOMOLOGIES**

**Part A: Embryonic Development**

1. When animals that have common ancestors, they look very similar when they start to develop into embryos (the starting formation of babies). We call this \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_.
2. Look at the embryos of different animals and write a sentence about the similarities. Include a what time period when you are able to distinguish some differences between the animals.

**🡪** The embryos of all the animals are similar because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. At around \_\_\_\_\_\_\_\_\_\_\_weeks one can begin to see differences between them. The embryos being the same is showing that\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

EVIDENCE TYPE 6: VESTIGIAL STRUCTURES

1. A vestigial structure is. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Look at the picture of the whale and its ancestors. List two examples of vestigial structures in the whale.

1.

2.

1. What would happen to a fish in a pitch black cave that was born with a mutation that prevented eyes from developing? Would this affect their survival rate? What phenotype might their children have?
2. Read the list of human vestigial structures shown in the table below. Explain why it became vestigial. Hint: Why would a caveman or monkey need the old structures?

|  |  |  |
| --- | --- | --- |
| Old Structure | Probable Function | Why is it vestigial? |
| Appendix | Might have produced enzymes to digest raw meat. | Humans cook our food, therefore do not need these enzymes |
| Wisdom Teeth | Chewing raw meat |  |
| Muscles that move ears | Hunting |  |
| Little Toe | Grab things, Grip branches for balance |  |
| Coccyx (tail bone) | Swing from branches |  |