**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Per\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_**

**Evidence for Evolution Activity**

Define evolution:

**Activity A: Molecular Comparisons:** Watch the video and answer the following questions.

<http://www.youtube.com/watch?v=GZCL3gv9kEM&safety_mode=true&persist_safety_mode=1&safe=active>

1. Identify the molecule responsible for making the necessary proteins in all organisms.
2. Name a change that occurs in genes or DNA causing offspring to be different from either parent.
3. Explain why the DNA in humans and chimpanzees is very similar.
4. Identify a significant difference between the chromosomes of chimpanzees and humans.
5. Describe a process that could explain why chimpanzees and humans have a different number of chromosomes.

**Activity B: Cladograms and Fossil Record “What Did T.rex Taste Like?”**

Go to the website and answer the following questions: <http://www.ucmp.berkeley.edu/education/explorations/tours/Trex/index.html> click on “Student Start”

Click on Beginning to Learn and read how to operate the website. Read about diversity of life and common ancestors.

**Folder 1:**

a. What is a lineage?

b. What is a “common ancestor”?

c. Explain why Max looks the way he does and why he is different from his parents. Where do his features come from?

d. In the box at the right, sketch a “branching diagram” showing life’s common ancestor at the bottom.

**Folder 2:**

1. Is the parrot more closely related to the human or the tuna? How do you know this?
2. Identify the other organisms in the diagram that have the same common ancestor as the parrot and the frog. Explain how you know this.

**Folder 3:** a. Define cladogram\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and read about how cladograms are useful to scientists.

|  |  |
| --- | --- |
| Letter on Cladogram | Inherited Feature |
| A |  |
| B |  |
| C |  |
| D |  |
| E |  |
| F |  |

1. Describe how organisms that are close to each other on a cladogram compare to with organisms that are farther away. Include “shared features” in your answer.
2. When you get to the cladogram with letters A-F, complete the table at the right.
3. Identify organisms that are tetrapods.

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

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1. As you move up the right branch of the cladogram, do the organisms still “branching off” have more or less features in common? Explain your answer with some examples from the cladogram.

**Folder 4:** a. Complete the following table to determine traits of organisms

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Trait** | **shark** | **tuna** | **frog** | **human** | **hare** | **caiman** | **parrot** | **T.rex** |
| Vertebrate |  |  |  |  |  |  |  |  |
| Bony skeleton |  |  |  |  |  |  |  |  |
| Four limbs |  |  |  |  |  |  |  |  |
| Amniotic egg |  |  |  |  |  |  |  |  |
| Hair |  |  |  |  |  |  |  |  |
| Opening in front of eye |  |  |  |  |  |  |  |  |

**+** = trait present

**0** = trait NOT present

**?** = we don’t know

1. Look at the table above and predict which 2 organisms would have the most similar DNA. Explain your answer.

c. What did T.Rex taste like? Explain why.

**Activity C. Embryology**

Look at the stages of embryo development for different organisms and compare by answering the following questions.

1. What similarities do you see in the early developmental stages of the embryos?

2. At which stage were you able to distinguish species from each other? Why? Give specific examples.

3. How do these similarities of embryos provide evidence for evolution?

4. Why do the embryos of some organisms have gill slits even though they do not live in water?

**Activity D: Comparative Anatomy**

Use the pictures to compare the arms of different mammals and answer the following questions.

1. Identify at least 2 similarities in the 5 mammals.
2. Identify at least 2 differences in the different mammals. Be specific.
3. Explain how scientists can use comparative anatomy as evidence for evolution.

**Activity E: Biogeography**

* Get a diagram of the southern continents, scissors, and glue.
* Follow all directions below.
* Ask your teacher for a diagram of the Gondwana supercontinent or use a reliable source on the internet to check your arrangement.



1. Name the southern continents, shown outlined above, that were part of the supercontinent, “Gondwana”.
2. Cut out just the southern continents from the continent page and arrange them as they were once positioned as Gondwana. Arrange them into the outline of Gondwana on the back of this page using the following information:
* The continent edges fit together much like puzzle pieces
* Ancient rock types match up on adjacent continents (rock type patterns)
* The direction of ice sheet movement will align on adjacent continents (arrows)
* The magnetic pole direction was similar on adjacent continents (compass)
* The same ancient plants and animals can be found on adjacent continents (reptile, leaves)

Outline of Gondwana Coastline



1. Fossils of Lystrosaurus have been found in Antarctica, South Africa, India, and Western China. Explain how fossils of this reptile could be found on both Antarctica and South Africa.
2. The southern beech tree (Nothofagus) is found in the southern hemisphere on the island of New Caledonia (just east of Australia), eastern Australia, New Zealand, and the southern tip of South America. Fossils of southern beech have also been found in Antarctica. The seeds are not easily spread by the wind and cannot survive in salt water.
3. Use a colored pen to show the location of southern beech trees and fossils on the current world map (reverse side) and on the completed map of Gondwana above.
4. Explain how the southern beech and its fossils can be located in such widespread locations.

5. Explain how continental drift and the theory of plate tectonics supports evolutionary theory.

6. The Atlantic Ocean is currently spreading apart at the average rate of 2 cm per year (cm/yr). Use conversion factors to determine the time it would take for Africa and South America to move to their current positions 2,300 km apart. Each continent moves half the distance, 1,150 km.

100 cm = 1 m

1,000 m = 1 km

2 cm = 1 yr