



# What Did T. rex Taste Like? (An Introduction to How Life is Related)

### Folders 1, 2 and 3 – Answer these questions as you go through the first 3 folders Please read all information on all the web pages to *prepare yourselves* to do the Special Assignment (Folder 5) after you have completed folder 4!!

## Folder 1: Life is *diverse* (varied, different, assorted) but all living things are related.

- 1. How many folders are in the web activity What Did T. rex Taste Like?
- 2. What do branching diagrams show? \_\_\_\_\_
- 3. If you know a synonym for "variety of life", write it here: \_\_\_\_\_
- 4. What 3 MAJOR groups of organisms exist and what are major characteristics for each group? Group Major Characteristics of the Group
- 5. Examine the diagram with the yellow circle indicating "common ancestor". What do you think this diagram is showing?
- What is the portion of the file about the people and family generations showing us? (Summarize your understanding of the pages on family genealogy and common ancestors of all life)
- 7. What are the 2 BIG IDEAS that are important to keep in mind through the rest of the activity?
- 8. What's the best definition for *lineage*?
- 9. What are some things that a single family and all of life have in common?

#### Folder 2: Lineages can be traced back in time to find a point of common ancestry.

- 10. From your own experience what does a caiman resemble?
- 11. The diagrams are showing how present day animals are related to each other. The dotted line at the bottom transitioning to a solid line portion of the diagram represents longer ago. The top of the diagram where the pictures are represents \_\_\_\_\_\_.
- 12. So if we were to explain the passage of time on this diagram, we would say that as time goes by we move from the bottom of the page to the \_\_\_\_\_.
- 13. Draw a quick picture below to show where on a branching diagram the *common ancestor* of a tuna and parrot would be. Circle the point in time when the common ancestor lived. Darken the part of your diagram that shows the tuna's and parrot distinct (separate) histories. Make a dashed line on your diagram where they share histories. Just write "tuna" and "parrot", no need to draw pictures.

Hour \_\_\_\_\_

14. Draw a branching diagram (cladogram) of animal X, Y, and Z that shows their lineage in this way: Animals X and Y are more closely related to each other than they are to Z. Circle the point on the diagram that shows X's and Y's most recent common ancestor and "square" the point on the diagram that shows all 3 animals' common ancestor. Circle the lined portion of your diagram that shows the common lineage among all three animals and label that circle "1". Now circle the lined portion of your diagram that show the unique or distinct separate history of Z and label it "2".

## Folder 3: Cladograms illustrate evolutionary relationships based upon shared inherited features.

- 15. Which animal is more closely related to a caiman: (circle one) parrot or hare?
- 16. What is the short red bar on the cladograms showing us? \_\_\_\_\_
- 17. Identify and BRIEFLY explain what each letter represents in the series of pages showing the inherited features of vertebrate animals:
  - A. \_\_\_\_\_\_ B. \_\_\_\_\_\_
  - C. \_\_\_\_\_
  - D. \_\_\_\_\_
- 18. What feature do ALL vertebrates share? \_\_\_\_\_
- 19. What do frogs, humans, hares, parrots, and caimans all share? \_\_\_\_\_
- 20. Which feature do human, hares, caimans, and parrots share that the other vertebrate lineages do not?
- 21. What is the difference between skulls of the common ancestors of humans/hares and those of

caimans/parrots? (Don't use pronouns like "it" and "they" in your answer!)

22. Which vertebrates have an opening IN FRONT of the eye? \_\_\_\_\_\_ and \_\_\_\_\_\_

23. In Folder 3 you've learned how *shared features* are used to determine \_\_\_\_\_\_

and \_\_\_\_\_\_ among animals.

24. *Cladograms* are used to visually show these \_\_\_\_\_\_

- 25. Which feature of hares and humans was inherited from a common ancestor?
- 26. Make two more observations from the vertebrate cladogram using what you've learned in so far.

Folder 4 – Answer these questions as you go through Folder 4.



- All living things are related by **COMMON ANCESTRY.**
- Branching diagrams, called **CLADOGRAMS** are used to illustrate evolutionary relationships.
- Cladograms are based on shared, **INHERITED** features.
- Cladograms refine our ability to understand and interpret EVOLUTIONARY history of living things.

## Folder 4: Evolutionary relationships can be used to answer many kinds of questions about the history of life.

- 2. List the features that you have already examined (shown in the cladogram) \_\_\_\_\_\_
- 3. It will be easier to understand if we make a \_\_\_\_\_\_ (or chart) of the information found on a cladogram.
- 4. For each feature (characteristic) a \_\_\_\_\_\_ of a table is filled out.
- 5. A + means that the feature is \_\_\_\_\_\_ in that organism.
- 6. A \_\_\_\_\_\_ on the cladogram shows which organisms SHARE (both have) that feature.
- 7. A **0** means that the feature is \_\_\_\_\_\_ in that organism.
- 8. A means that the feature can't be \_\_\_\_\_\_ for that organism because it doesn't apply.

Write the example to help you understand what 🗕 means. \_\_\_\_\_

- 9. If we can't tell if a certain feature is present or not then a \_\_\_\_\_\_ is used in our table (chart).
- 10. Fill in the tables below. They will ALSO be on the web pages on your computer, do BOTH in as you go through folder 4.

# Features or Characteristics Table

Fill in the data tables below, using a +, --, 0, or ?

|                            | Shart | *un® | \$r00 | hurr | an hare | cairr | an par | ro <sup>60</sup> 5.1 |
|----------------------------|-------|------|-------|------|---------|-------|--------|----------------------|
| vertebrae                  |       |      |       |      |         |       |        |                      |
| bony<br>skeleton           |       |      |       |      |         |       |        |                      |
| four limbs                 |       |      |       |      |         |       |        |                      |
| amniotic<br>egg            |       |      |       |      |         |       |        |                      |
| hair                       |       |      |       |      |         |       |        |                      |
| opening in<br>front of eye |       |      |       |      |         |       |        |                      |

When asked to do so, "zoom" in to this section of the table:

|  | airm | ar | xoxu | ret |
|--|------|----|------|-----|
|  | 00   | Q. | ×.   |     |
| vertebrae  |      |    |      |     |
| bony<br>skeleton                                   |      |    |      |     |
| four limbs   |      |    |      |     |
| amniotic<br>egg                                    |      |    |      |     |
| hair   |      |    |      |     |
| opening in<br>front of eye                         |      |    |      |     |
| heel   |      |    |      |     |
| bipedal  |      |    |      |     |
| 4 <sup>th</sup> and 5 <sup>th</sup><br>finger lost |      |    |      |     |

Now that you've finished the tables answer the remaining questions for Folder 4.

we can figure out from the data that *T Rex* (write the answers, not just the letter!)

14. Now it's time for your Special Assignment... found in Folder 5. Use what you've learned in Folders 1-4!!

# Folder 5 – Special Assignment

#### Use this handout to complete the special assignment given you in Folder 5.

#### Purpose:

Use the cladogram and data on inherited features to make hypotheses about what T. Rex was like and what features it might have shared with other vertebrates.

#### **Materials Needed:**

You will need the cladogram and additional table below and your completed Features Table from the previous folders.

#### Folder 5: We can use cladograms to make inferences about past life, including T Rex.

- First, just read and examine Questions 1-6 below.
- Now, choose to work with (at least) 2 of these questions to do the following.
- 1. On the back of this page, create an organized way to show that you have done these things with your 2 questions:
  - a. Decide if it is **possible** to answer each of your 2 chosen questions using the data and information you have.
  - b. If it **is NOT possible** to answer a particular question, then explain what information is needed to be able to answer the question.
- 2. If it IS possible to answer a particular question:
  - a. Make a reasonable guess to answer the question and include evidence you used.
  - b. Include information about common ancestors and shared inherited features.

#### Questions 1-6:

- 1. Did T. Rex have had an amniotic egg?
- 2. Was T. Rex warm-blooded or cold-blooded?
- 3. Could T. Rex have had feathers?
- 4. Did T. Rex have color vision?
- 5. How many chambers were there in *T. Rex*'s heart?
- 6. Did *T. Rex* sing to its offspring?



|                              | caim | Parr | 1. re |
|------------------------------|------|------|-------|
| color vision                 | +    | +    |       |
| warm<br>blooded              | 0    | +    |       |
| feathers                     | 0    | +    |       |
| eing<br>to young             | +    | +    |       |
| øcaly økin                   | +    | +    |       |
| melanin pig-<br>ment in økin | +    | +    |       |
| amniotic<br>egg              | +    | +    |       |
| few glandø<br>in økin        | +    | +    |       |
| hole in hip<br>øocket        | 0    | +    |       |
| 3-chambered<br>heart         | +    | 0    |       |
| 4-chambered<br>heart         | 0    | +    |       |



4.

How to answer the special assignment....

Example:

Question: <u>3 Could T. Rex have had feathers?</u>

- Possible or NOT Possible (Circle one)
- We think that T. Rex could have had feathers *because* of this evidence from the cladogram: Common ancestors of \_\_\_\_\_\_ and \_\_\_\_\_ very likely had \_\_\_\_\_\_ as shared features.

## List the two questions you have chosen to work with...

Question \_\_\_\_\_

- Can you answer the question? POSSIBLE NOT POSSIBLE
- If NO, what information do you need? If YES, What is your guess and what evidence are you using to get your answer?

Question \_\_\_\_\_

- Can you answer the question? POSSIBLE NOT POSSIBLE
- If NO, what information do you need? If YES, What is your guess and what evidence are you using to get your answer?

# What Did T. Rex Taste Like? Post Test



- 1. What is a CLADOGRAM?
- 2. Draw a cladogram with a frog, cow, and horse correctly placed.
- 3. Please circle the answer that best completes this statement: A *common ancestor* is: A. one that is very commonly seen in the fossil record.
  - B. one that is shared by two or more organisms.
  - C. on that has no distinguishing features and is therefore very common.

#### Read the following statements. Then answer number question 4 below.

- X. All organisms inherit their features from their ancestors.
- Y. Organisms resemble their most recent ancestors more closely than distant ancestors.
- Z. Over time evolution occurs and new features can appear depending on the environment.
- 4. Which of the statement above are accurate? Circle your answer.
  - a. X and Z
  - b. Y and Z
  - c. X, Y, and Z
  - d. None

#### Examine the following diagram and the statements that follow. Then answer question 5.



#### Statements:

- 1. Crocodiles are more closely related to frippities than to squirrels.
- 2. Frippities share a more recent common ancestor with Triceratops than with pigeons.
- 3. Frippities probably laid eggs.
- 4. All of these animals share a common ancestor at some point in time.
- 5. Which of the statements are accurate? Circle your answer.
  - a. Only 1 and 3
  - b. Only 2 and 4
  - c. Only 3 and 4
  - d. Only 1, 3, and 4
  - e. 1, 2, 3, and 4 (ALL of the statements)

This is EXTRA CREDIT, but only if you have completed ALL of the previous work!!!!!

# **Example of Evolution: Survival of the Sneakiest**

## Answer the following questions.

1. When it comes to crickets, what does fitness mean?

2. Is calling good or bad for a cricket's fitness? Why or why not?

3. Give some examples of selection at work in this cricket story.

4. How does selection favor calling? How does selection favor not calling?