THE LOST WORLD

INTRODUCTION

Why do leopard frogs have green backs? The ultimate explanation for the frog's coloring (and for every trait in every organism) lies in natural selection theory. The species evolved to be green because this color was well adapted to the frog's environment, and individuals with green backs survived better and left more green backed offspring to the next generation.

If you were given an unknown organism, could you, by observing it, explain what its natural habitat (home) is probably like? What it normally eats? How and where it normally spends its time? With an understanding of adaptation and natural selection theory, you could. Organisms' colors, structures, and habits (all of their characteristics) are shaped by an environment that includes their physical surroundings and their interactions with other organisms. So an animal's features, such as body covering, teeth type and limb shape, provide clues about how and where that animal lives.

What if you only had part of an unknown animal that was no longer present on earth? Could you figure out what the rest of the animal looked like and how it lived? This is what **paleontologists** do. Often using just fragments of evidence from partial fossil skeletons, they try to deduce what the whole animal looked like. They then make educated guesses about the animal and how it interacted with other organisms and with its physical surroundings. They also apply this knowledge to figure out its place in evolutionary history. In this activity, you will be challenged to think like a paleontologist. From a skull of an unknown, extinct animal, you will attempt to recreate its body structure, habitat, and niche. You will also explain its most likely extinction, and tie your findings into natural selection theory.

NGSS STANDARDS ADDRESSED:

HS LS 4-4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS LS 4-5: Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

THE TASKS

1. Begin to observe the skull with your group members and brainstorm possibilities for what the animal looked like and how it lived. These are extinct animals! Create a list of questions you would like to answer about your animal. Record your generated questions.
2. Using the internet or textbook, research the answers to your questions above. Please make sure to document the website or book used.
3. Summarize and organize your findings in the Data Sheet A, describing appropriate inferences based on the research done in Task 2.
4. Make a side view drawing of the skull on the graph paper. Make the drawing large enough to fill much of the paper. Use the squares on the graph paper to keep the skull's proportions right. For example, if the skull is 3 cm long and 2 cm high, you might make it fifteen boxes long and ten boxes high.
5. Affix the graph paper with the skull drawing to your construction paper. Now draw your idea for the animal's body on the construction paper coming out from the base of the skull drawing. Unlike your skull drawing, though, make the body drawing complete with your idea for the outer covering (skin, hair, feathers, scales, and so on). Around the body draw in features of its habitat. Include predators and prey of your extinct animal.
6. Give a scientific name to your animal. A scientific name consists of two words, the genus and the species. The words are Latin and they are always either underlined or in italics. Also, the genus is capitalized and the species begins with a lower-case letter. For example, *Homo sapiens* is the scientific name of humans. Place the scientific name on the top of your paper.
7. Organize the ideas and the explanations that are to be included in your final report (see below). The report will should be typed using 12 point Times New Roman/ Arial font. See below for more information.
8. Present your findings to the class. Follow the rubric below.

TYPED GROUP REPORT (ONLY ONE SUBMITTED PER GROUP)

Each group's report should include:

-A title page that has all group members' names, class name, and period. Also, include the scientific name of your animal on the title page. Example of scientific name: *Canis lupus* (follow the format)

-Data from data sheet (typed findings)

-Explanations of the animal's:

- Body design as seen in the drawing
- Mobility - How did it move around?
- Habitat (Home)
- Niche - What did it eat? How did it find food? What else did it spend its time doing? Was it solitary or did it live in groups?
- Defense - How did it escape or protect itself from predators?
- Sleeping patterns- Is the animal nocturnal or diurnal? How can you tell?

-Darwinian explanation of the animal's evolution – Use Darwin's theory of evolution by natural selection to explain how your animal evolved from a previous organism. For example, if you think your animal is related to the extinct *T. rex,* then explain how the unique features of your animal evolved from a *T. rex,* like ancestor. And, how was your animal adapted to its environment? What were the advantages of this adaptation?

-Extinction: What lead to your animal's extinction? Describe this process.

For each, be sure to also explain the **evidence and reasoning that your ideas are based on.

Affix your typed report to your drawing. Make sure your drawing has the skull, body, habitat, predators, and prey.

ORAL PRESENTATION

Your group will give a presentation (approximately 5 minutes) on your findings. Your peers will be encouraged to ask you questions. Your presentation rubric is below.

	1	2	3	4	
Organization	Audience cannot understand presentation because there is no sequence of information.	Audience has difficulty following presentation because student jumps around.	Student presents information in logical sequence which audience can follow.	Student presents information in logical, interesting sequence which audience can follow.	——
Content Knowledge	Students do not have grasp of information; students cannot answer questions about subject.	Students are uncomfortable with information and are able to answer only low-level questions.	Students are at ease with content, but fails to elaborate.	Students demonstrates full knowledge (more than required) with explanations and elaboration.	——
Visuals	Students used no visuals.	Students occasional used visuals that rarely support text and presentation.	Visuals related to text and presentation.	Students used visuals to reinforce presentation.	——
Natural Selection Discussion	Students did not connect their animal to a common ancestor.	Students barely discussed natural selection and their animals' common ancestor.	Students discussed natural selection and their animals' common ancestor.	Students demonstrated full knowledge of natural selection and their animals' common ancestor.	——
Delivery (All students must speak)	Students mumble, incorrectly pronounces terms, and speaks too quietly for students in the back of class to hear.	Students incorrectly pronounce terms. Audience members have difficulty hearing presentation.	Students' voices are clear. Students pronounce most words correctly.	Students used a clear voice and correct, precise pronunciation of terms. ALL members are heard in the presentation	——
				Total (out of 20)---->	——

THE LOST WORLD - INFERENCES SUMMARY TABLE

Task 1: Look at your provided skull. Create at list seven (7) questions that you want answered about your skull. Place your questions below. An example is provided for you.

Example: Why does my skull have sharp front teeth?

Questions:

1)

2)

3)

4)

5)

6)

7)

Task 2: Using the internet or textbook, research the answers to your questions above. Please make sure to document the website or book used.

Task 3: Summarize and organize your findings in the table below, describing appropriate inferences based on the research done in Task 2.

> To **infer** is to arrive at a conclusion based on evidence and reasoning. Inferences may even be based on only slight evidence. Most of your ideas about your animal's appearance and habitats will be reasoned deductions or inferences.

Fill the summary table below for all of your group's inferences about your animals.

Inference	Evidence to Support the Inference
Example: The skull was a predator eating mice as a source of food.	The evidence on the skull is the large, fang-like canine teeth.