**Lesson 6: Red-Bellied Snakes**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Project ID: \_\_\_\_\_\_\_\_\_\_

Period: \_\_\_\_

Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lesson 6 – Red-Bellied Black Snakes**



1. In this lesson you will develop a model to show why the head size of the Australian Red-Bellied Black Snake has changed in size over the past 75 years.

2. In groups, study Evidence 1-6 on the computer. Then, discuss each question you see on the computer and try to reach a consensus. Be sure you listen to everyone’s ideas.

After you understand each piece of evidence, discuss the questions for that evidence below. When you all agree on the best answer, individually circle or write your answer.

Evidence 1: What happens to the Red-Bellied Black Snakes when they eat cane toads?

1. The snakes always live.
2. The snakes always die.
3. The snakes nearly always die.
4. The snakes sometimes die.
5. The snakes do not eat cane toads.

Evidence 2: What happened to the population of poisonous cane toads when they were introduced to Australia in 1935?

1. The toads immediately spread along both the East coast of Australia and into areas farther from the coast.
2. The toads immediately spread along the East coast of Australia, but did not ever spread into areas away from the coast.
3. The toads slowly spread along the East coast of Australia and later into areas farther from the coast.
4. The toads slowly spread along the East coast of Australia, but did not spread into areas away from the coast.

Evidence 3: Where were snakes with heads big enough to eat adult toads more likely to be found?

1. They were more likely to be found in areas with many cane toads.
2. They were more likely to be found in areas with no cane toads.
3. They were equally likely to be found in areas with many cane toads and in areas with no cane toads.
4. The scientists did not find any with heads big enough to eat the cane toads.

Evidence 3: In groups, discuss this question and individually write your best answer: What do you conclude from Evidence 3?

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

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

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

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

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

Evidence 4: Which of the following is true according to the newsletter article?

1. 10 new baby snakes were born at the zoo.
2. 5 new baby snakes were born at the zoo.
3. The mother snake is taking care of 6 baby snakes.
4. The baby snakes have small heads when they are just born.

Evidence 5: How many mistakes are there in the following statement? Scientists studied 100 Red-Bellied Black Snakes using RNA evaluation techniques and discovered that the head size of the Red-Bellied Black Snake is not a genetically inherited trait.

1. 0
2. 1
3. 2
4. 3

Evidence 6: What is true about the results of the study?

A. None of the snakes’ heads got smaller.

B. The heads of snakes that were placed in areas with poisonous toads got smaller.

C. The heads of snakes that were placed in areas with poisonous toads got bigger.

D. All of the snakes had smaller heads when they were captured again.

3. Using the evidence, in pairs develop a model that shows why the head size of the Australian Red-Bellied Black Snakes has changed since 1935. Develop your model in the space below. Think about what you have learned about evolutionary changes in the mountain sheep and the peppered moths as you develop your model. Make sure your model can be understood by anyone who reads it.

|  |
| --- |
|  |

4. Next you will discuss 2 models in class. For each model, discuss the question below in pairs, and then write your answers individually.

A. Which evidence contradicts Model A? Why does it contradict it?

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

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

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

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

B. Which evidence is not included in Model B? Give reasons for your answer.

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

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

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

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

5. Now look at Model C, and complete an arrows diagram for the evidence and the model you selected.

A. In groups, discuss each evidence and which rating and arrows are best. Ask each other questions; give lots of reasons; listen to and think about each person’s ideas.

B. After discussing each evidence, individually write your rating and arrows on the diagram. Be prepared to explain to the class each of your arrows.

C. Then individually write your answers to Questions 6 and 7.

D. Next, discuss these questions in groups:

(1) How good is Model C? Why do you think so?

(2) Show the group your pair’s initial model. Does your initial model fit all of the evidence? Is there any evidence that contradicts your initial model? How do you compare your model to Model C?

**ARROWS DIAGRAM**

|  |  |
| --- | --- |
| **Evidence Goodness** | **MODEL C** |
| **Evidence 1**  Snakes often die when they eat poisonous toads. |  |
| **Evidence 2**  The spread of poisonous toads in Australia from 1935 to 2001. |  |
| **Evidence 3**  Snakes in areas with poisonous toads have smaller heads than snakes in areas without poisonous toads. |  |
| **Evidence 4**  Sydney Zoo Newsletter reports 6 new baby snakes born. |  |
| **Evidence 5**  Head size in Red-Bellied Black Snakes is a genetically inherited trait. |  |
| **Evidence 6**  The head size of adult Red-Bellied Black Snakes does not ever decrease. |  |

6. What arrow did you draw between Evidence 3 and Model C? Write your reasons for your arrow choice.

Draw arrow:

Here:

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

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

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

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

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

7. What arrow did you draw between Evidence 5 and Model C? Write your reasons for your arrow choice.

Draw arrow:

Here:

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

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

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

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

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