Scientific Method

Case Study – Why do Giraffes have long necks?

Use the steps of the scientific method to answer the question.

Step 1 – Observation

Giraffes are the tallest animals on the planet, and this height comes primarily from a disproportionately long neck and legs. As a budding biologist, you are curious as to the evolutionary pressures that have given rise to the elongated neck structure in the giraffe.

Step 2 – Develop your Hypothesis

Individually or in groups come up with at least 2 potential hypotheses to explain why the giraffe evolved a long neck.

Hypothesis 1:

Hypothesis 2:

Compile a list of potential hypotheses as a class. Your teacher will choose one for the class to investigate further.

Class Hypothesis:

Step 3 – Experimental Design

How can you test your class hypothesis?

Step 4 – Predictions (Experiment 1)

Your teacher will describe an experimental design to test your class hypothesis. What results would you expect based on the class hypothesis?

Step 5 -Data Collection

Do the results from Experiment 1 support the class hypothesis? Yes or no and why?

Step 4 – Predictions (Experiment 2)

Your teacher will describe a second experimental design to test your class hypothesis. What results would you expect based on the class hypothesis?

Step 5 -Data Collection

Do the results from Experiment 2 support the class hypothesis? Yes or no and why?

New Information - While you were collecting data in the field you noticed the giraffe exhibiting some interesting behavior.

Stages 2 and 3 – Hypothesis and Experimental Design

Use the information given to you by your teacher to develop a new class hypothesis and design an experiment to test that hypothesis.

Stage 4 – Predictions (Experiment 3)

Your teacher will describe a second experimental design to test your class hypothesis. What results would you expect based on the class hypothesis?

Step 5 -Data Collection

Do the results from Experiment 2 support the class hypothesis? Yes or no and why?

Questions:

1. Why did the giraffe evolve long necks?

2. What have you learned about the scientific process in this exercise?

3. What is the role of experiments/observations in the process of science?

4. How does a hypothesis help move science forward, even if it is not supported by the evidence?