Niamh Barry JC Science 2017 Specification

Learning Outcomes:

Nature of Science	Students should be able to research and present information on the contribution that scientists make to scientific discovery and invention, and its impact on society
Biological World	Students should be able to evaluate how humans can successfully conserve ecological biodiversity and contribute to global food production; appreciate the benefits that people obtain from ecosystems

Task

You are a student intern in a research laboratory. The lab's supervisor has asked you to gather data using a new procedure designed to simulate natural selection in beetles. Your task is to use the data to explain the connection between an organism's traits and its ability to survive and reproduce. You will present your data and explanation to a group of First Year students, who have planned a visit to the lab.

Review the procedure below.

• Complete the procedure. Be sure to record all your data.

Procedure

1. Create a population of beetles. Put a number on each card that represents the number of black spots on the individual.

2. Swop you population of beetles with another group. Calculate the average number of black spots of the population of beetles represented by your peers cards.

3. Suppose beetles live on bushes with green and yellow mottled leaves.

4. A disease causes black spots to form on many of the leaves. Only beetles with at least 6 black spots are safe from predators on these leaves.

5. All the beetles with fewer than 6 black spots are eaten by predators. Discard all of the cards with a number under 6.

6. Calculate the new average number of black spots on the beetles. 5. Shuffle the deck of remaining cards.

7. Draw two cards at a time. Each pair represents a pair of beetles that will mate.

8. The offspring of each pair has the average number of black spots of its parents. Calculate and record the number of black spots on each offspring.

9. Discard all parents and offspring with fewer than 8 black spots and repeat steps 5-7. Now calculate the new average number of black spots on the beetles. Include both the parents and the offspring in your calculation.

Think about how you can organise and display your data. After you have a plan in place, create your display.

• Analyse your data. Does it show evidence that variations in traits in a population can increase or decrease an individual's probability of surviving and reproducing? How?

• Develop a written explanation of your data. Think about the following while you work.

- If you had not removed the beetles with 5 or fewer black spots, would the average number of black spots in the population have changed as much?
- If there had been no variation in number of black spots before the disease affected the plants, would the population have been able to adapt and survive due to natural selection?

Share your data and explanation with your laboratory supervisor and the group of middle-school students who are visiting the lab.

- Analyse your explanation.
- What are its strengths and weaknesses?
- Did it meet the goal of showing First Year students the connection between an organism's traits and the probability that the organism will survive and reproduce? Why or why not?