Owl Family Natural Selection

Strand Heredity and Genetics

Topic Investigating biologic evolution

Primary SOL LS.13 The student will investigate and understand that populations of organisms change over time. Key concepts include
- a) the relationships of mutation, adaptation, natural selection, and extinction;
- c) how environmental influences, as well as genetic variation, can lead to diversity of organisms.

Related SOL LS.10 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. Key concepts include
- b) factors that increase or decrease population size.

LS.9 The student will investigate and understand how organisms adapt to biotic and abiotic factors in an ecosystem. Key concepts include
- c) adaptations that enable organisms to survive within a specific ecosystem.

Background Information

Gene mutations can lead to variations within a population. If mutation results in a structure, function, or behavior that helps the organisms survive, the gene may be favored and persist through the process of *natural selection.*

Materials

- Class set of role cards (attached)
- Plastic forks (talons) for mother and father owls
- 20 forks with various prongs removed to represent structural adaptations within the species (for example, two forks with all tongs intact, two missing the left tong, two missing both middle tongs, two missing far right, two missing prong 2 and 4, two with no tongs, etc. Variety is the key!)
- 4 paper plates (food sources)
- Dried beans: majority of one type, small sampling of another (food)
- Labels for each table representing each color (nest)
- Small plastic cups (baby owl's mouth)
- Copies of data collection chart (attached)
- Stopwatch

Vocabulary

adaptation, DNA, extinction, gene, genetics, heredity, mutation, natural selection, offspring, reproduce, structure

* Teacher should reinforce vocabulary terms through activities such as memory devices, vocabulary cards, interactive notebook, etc.

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Classroom seating should be arranged into five groups representing nests.

1. As students enter the classroom, pass out a role assignment using the cards below. Have students sit in the appropriate nest as assigned by color. Explain that this group represents an owl family. The goal of this demonstration is to have all members of the family survive. Factors that can affect survival include
   - starvation—not receiving enough beans
   - falling from nest—talking during the feeding activity
   - poisoning—receiving the "marked" beans. *(DO NOT warn students of this risk. Let that be a surprise later.)*
2. Prepare four food sources by placing a variety of beans on paper plates. These plates will be placed around the room for mother owls and father owls to collect and distribute to their respective babies. (TIP: Make it difficult for some of the groups to reach the food sources to simulate how location can affect an organism's ability to obtain food.) Allow parent owls to randomly select two talons (manipulated forks placed upside down in an opaque cup/jar drawn out by each student).
3. Allow mother and father owls to move away from the nests to collect food for their young. Set a time period parent owls can collect food ranging anywhere from three to five minutes or until the food sources are depleted. Parents are only allowed to pick up and carry beans using the talons they selected. Children must remain in their seat at the nest while holding a plastic cup against their chin. Moving out of seat or talking during food collection represents falling from the nest and therefore death; children are ONLY allowed to quietly chirp to alert parents of their need for food.
4. Monitor students during the feeding. If a student talks (i.e., falls from the nest), remove his/her cup. When appropriate, call for all parent owls to put talons down, and have baby owls count the number of beans collected. Share results with the full class to complete the data collection chart listed below.
5. After data are collected, reveal the number of beans needed to avoid starvation. This number will vary based on your class results; the cut-off could range anywhere from 10–50 beans. For example, if 17 is the level needed to survive, then all owls with 16 or fewer beans will die. Also, reveal which beans were poisoned. For example, if the majority of beans used are pinto and black beans, then five randomly dispersed lima beans could represent the poison. Any student with a lima bean will also die. This information will enable students to calculate percent survival of each nest.

Assessment

- **Questions**
  - Why were the talons shaped in different ways?
  - Which talons were most successful in delivering food to the nests?

  - How does the location of the food source affect the amount of food available for each nest?
  - Which nest in your class had the highest survival rate? What are some possible explanations as to why this group was so successful?
  - Which nest in your class had the lowest survival rate? Why were they unable to survive?
  - Do you think there is a possibility for baby owls to be poisoned in their natural environment? Is it possible to fall from the nest? How would these events affect the survival rate for the species?
- **Journal/Writing Prompts**
  - Describe what the different talons represent. Explain how the talons used in our simulation relate to an owl in its natural environment.
  - Based on your knowledge of natural selection, explain which owl families are most likely to survive and why.

Extensions and Connections (for all students)

- Select another species and describe how structural/genetic adaptations and mutations could affect its survival.

Strategies for Differentiation

- Examine owls' hunting practices. How do owls hunt? When do owls hunt? What are their primary food sources? How does their hunting compare to that of eagles? Who is the primary hunter: father or mother or both? What happens if one parent dies?
- It may be beneficial to assign a struggling student the role of mother or father to have a more active role in collection process. This may enable the student to better process the experience and promote retention of the material presented.

CLASS SET OF ROLE CARDS

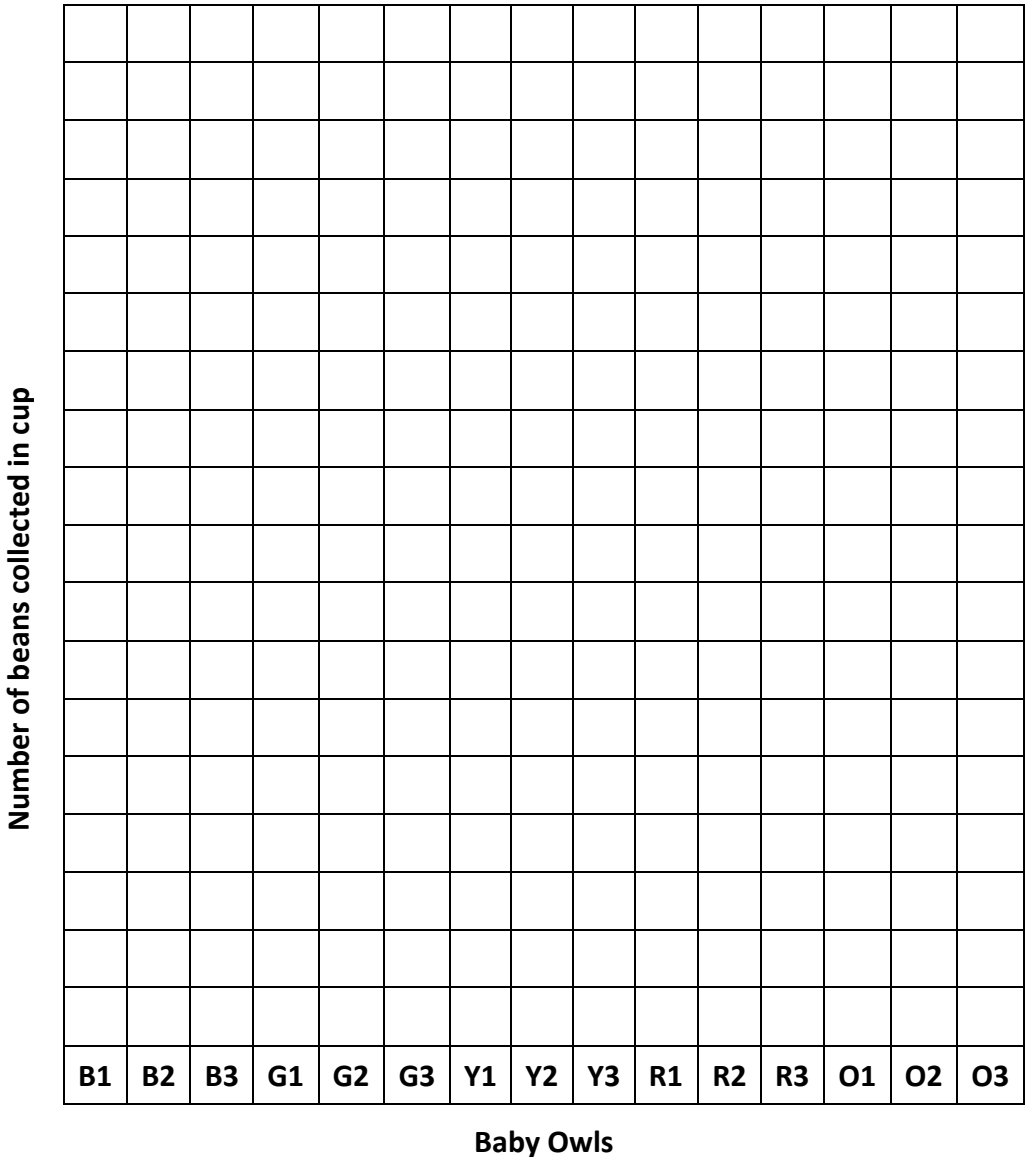
Name: _____ **Date:** _____

Blue Owl Mom	Green Owl Mom	Yellow Owl Mom	Red Owl Mom	Orange Owl Mom
Blue Owl Dad	Green Owl Dad	Yellow Owl Dad	Red Owl Dad	Orange Owl Dad
Blue Baby 1	Green Baby 1	Yellow Baby 1	Red Baby 1	Orange Baby 1
Blue Baby 2	Green Baby 2	Yellow Baby 2	Red Baby 2	Orange Baby 2
Blue Baby 3	Green Baby 3	Yellow Baby 3	Red Baby 3	Orange Baby 3

Owl Family Natural Selection Data Collection

Name: _____ **Date:** _____

Class Role Cards



Survival Rates

Blue Nest ____/_____ or _____% Green Nest ____/____ or _____%

Yellow Nest ____/_____ or _____% Red Nest ____/____ or _____%

Orange Nest ____/_____ or _____%