**Mice and Munchies**

**Lesson Summary:** In this lesson, students will explore interrelationships and adaptations between prey and predators. They will determine features of competition between animals in a habitat for available resources.

**Materials:**

* Pictures of deer mice showing their adaptive features (camouflaged coloration on upper side of body, long vs. short tails, gathering food at night, color variations based on habitat, etc.)
* Chart paper
* Aluminum trays
* Two types of dry beans, ideally that are easily distinguishable from one another in size and color

**Essential Understanding:** Students will infer how deer mice use adaptive features to escape their enemies, recognize some of the limiting factors in an environment’s ability to support a species of organisms, describe how competition affects the survival of members of a species, and communicate the importance of adequate resources to sustain life.

**Knowledge and Skills Developed:** Students will engage in scientific inquiry through inferring, analyzing, determining causes and effects, and concluding.

**Introduction:**

Scientists estimate that people share this planet with 40 to 80 million different species of plants and animals, most of which are insects. So far, scientists have only identified about 1.5 million different species of plants and animals!

 Biological diversity (biodiversity), one of the Earth’s most valuable resources, consists of three components: genetic diversity, species diversity, and ecological diversity.

 Genetic diversity is the variability in the genetic makeup among individuals within a single species. Species diversity is the variety of species on Earth. Ecological diversity is the variety of forests, deserts, grasslands, streams, lakes, oceans, and other communities that interact with one another.

 When an organism’s environment changes, the organism must either move, adapt, or die out. The change of an organism over time that makes it suited to its environment is called adaptation.

 Adaptation is the result of variation and the selecting power of the environment. For example, plants in a population have differing capacities for producing cutin (a waxy, outer coating) on their leaves. Some individuals are heavily covered with this protective covering, while others are only thinly covered. If the climate becomes drier, as it did in the Sahara Desert, plants with thicker cutin will not dry as fast as those with thin cutin and may live to set a crop of seed. These individuals have been “selected.” Succeeding generations will also show variability, and those with the best protection against drying will be the ones to live and produce. In this instance, only one feature, cuticular covering, was pointed out, but in reality a plant would have to possess a whole range of features that work together. It is the species, not the individual, which adapts.

 Deer mice represent just one species of an amazing assortment of animals we refer to as wildlife. Deer mice, like all species of wildlife, have basic needs for food, water, shelter, and space. Deer mice are relatively solitary creatures, and they do not often interact with other species of mice. Despite their isolated lifestyle, deer mice still interact with other animal species, different plant communities, various climatic conditions, and with all the various elements that affect life on planet Earth. And the deer mouse survives. What are some of the adaptations that allow deer mice to escape from their predators, travel over varied terrain, find protection for them and their young, and find sufficient food and water?

**Core Lesson:**

1. Prepare the trays of beans by putting roughly the same amount of one type of bean in each tray, then varying the amounts of the other beans from tray to tray.
2. Show the students several pictures of deer mice.
3. What are some of the special features of deer mice in these pictures? Set up a table and list students’ responses on the chart. How do these features help deer mice survive? Add these ideas to the chart.
4. What are some reasons that deer mice die? List the suggestions on the chart.
5. Some deer mice, like all other organisms, die because their environment is not able to meet their basic life needs. What are these needs? What could be happening so that a deer mouse’s needs were not being met?
6. Divide the students into groups of 2 or 3, and give each group a tray of mixed beans. Explain that you will be the “owl” and they will be the “deer mice.”
7. As deer mice, the students must hunt through the tray of mixed beans to find the different beans. They must find them as quickly as possible, because deer mice have extremely high metabolisms and must eat constantly. Each student will take turns selecting from the tray, and only one bean may be taken during a turn.
8. If approached by the owl, the students must set down the beans they have already collected and turn around from the tray. They may continue feeding only after the owl has departed from their eating area. Upon hearing the stop signal, students must stop immediately and set down their beans. Tell the students what the start and stop signals will be.
9. When all of the students are in place, give the signal to start.
10. As the owl, try to disturb one or two groups more than the other groups. After the activity is completed, discuss the frequency of disturbances for those groups to be “hunted.” What could have contributed to the frequency of some groups to be hunted over other groups? (i.e. time of day, habitat, availability of shelter, etc.)
11. Stop the feeding period exactly after 10 minutes. Have the students count the number of beans that they collected from their trays.
12. Have each group discuss the amount of food each mouse was able to eat. Ask each group about the factors affecting how much food they were able to get. Record each new factor.
13. When all groups have shared, say: “If a deer mouse needed to eat 20 beans per day in order to survive, how many of your deer mice are still alive?”
14. If the students did not get enough to eat, what were the causes of death?
15. Ask students to summarize what they learned about interrelationships and adaptations between the owl and deer mouse.

**Extensions**

* Discuss with the students what effect habitat has on the frequency of being hunted.
* Deer mice are primarily nocturnal, just like owls. Do you think that this contributes to the fact that owls eat deer mice more than other species of mice?
* Discuss how weather can affect habitats and populations of prey and predators.

**References**

* Outdoor Science Adventures for Elementary Students: A Field-Based Science Curriculum, developed by the SMILE Program at Oregon State University
* South Dakota Department of Game, Fish, and Parks, Division of Wildlife
* Oregon Department of Fish and Wildlife, Oregon Wildlife Species