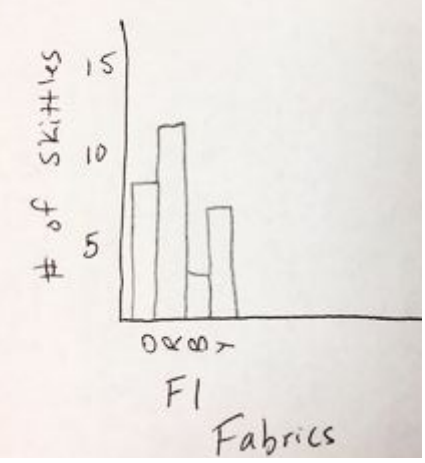
Selection and Evolution - Meeting #8

Topics *(Meeting # 8)*	Agenda/Activities	Time Required
Selection and Evolution *(Meeting #8)*	1. Students sign-in and have snack	5 min
	2. Split Students into Groups *(Ideally 5-7 per group)*	5 min
	3. Complete the Hidden Animals PowerPoint Activity	10 min
	https://docs.google.com/presentation/d/15dZfXCG5EjlZmOfxRDCggfKmp53ct2arwFj1V78F_ik/edit?usp=sharing	30 min
**WILL NEED COMPUTER ACCESS WITH INTERNET FOR VIDEOS*		2 min
	4. Facilitate the Skittle Experiment (full description below)	
	5. Watch the peppered moth video https://www.youtube.com/watch?v=LyRA807djLc	3 min
	6. Watch the video on Natural Selection https://www.youtube.com/watch?v=vnktXHBvE8s	10 min
	7. Project Wild: Thicket Game *(see attached)*	20-30 min
	8. Professional Speaker via Google Hangout or career videos *(see below)* https://www.youtube.com/watch?v=SSkbt6uD3fI	20 min
	9. Complete Content Questions and Microblogs	5 min
	10. Handout Newsletter upon leaving	

Skittle Experiment Instructions

1. Skittle Experiment
    a. Students should turn their backs to the table.
    b. Teacher places fabric on the table and then will randomly spread skittles across the fabric.
    c. Lights are then turned off, students are asked to turn around to face the table and are asked to remove the first 5 pieces of candy they spot, in a picking fashion (no scraping over the table).
    d. The number of Skittles of each color are counted, recorded, and plotted for each individual fabric into a histogram. Example:



    e. Prior to each of the following fabric colors, students are asked to draw predictions for what it will look like in the future based on what they've seen and to compare current and past predictions.
    f. Experiment is repeated with different colors/patterns of cloth to simulate different environments.

    g. Experiment can be modified so that Skittles are replaced based on the proportion present to simulate reproduction, which ties back to genetics/inheritance. Extension: This could possibly be done under black light to see if it affects which beans are eaten (simulates insect sight).
2. Group discussion on why certain skittles were picked up and others were not.
3. Compare this activity to various biomes (e.g., savanna, tundra, rainforest) and the organisms that live there. What does this activity help explain in regards to natural selection (see video that follows this activity)?

What should students know before they leave the club?

- The basics of predictive equation modeling
- A large amount of evidence has been collected and reported to support these theories.
- Certain biological adaptations can benefit organisms survival.
- Basics of histogram graphs and how to plot data on a histogram.

NC Essential Standards Met

8.L.4	Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time
8.L.4.1	Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution.
8.L.4.2	Explain the relationship between genetic variation and an organism's ability to adapt to its environment.
5.L.3	Understand why organisms differ from or are similar to their parents based on the characteristics of the organism.
5.L.3.1	Explain why organisms differ from or are similar to their parents based on the characteristics of the organism.
5.L.3.2	Give examples of likenesses that are inherited and some that are not.
7.RP.2	Recognize and represent proportional relationships between quantities.
8.EE.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
8.F.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

More multimedia sites for further information

Videos/Interesting articles:

https://www.youtube.com/watch?v=64JUJdZdDQo
http://www.pbs.org/wgbh/nova/evolution/evolution-action.html
https://concord.org/stem-resources/natural-selection
http://www.coolmath.com/algebra/17-exponentials-logarithms/06-population-exponential-growth-01
https://www.youtube.com/watch?v=mcM23M-CCog
https://www.youtube.com/watch?v=Pv4Ca-f4W9Q

Vocab

- Natural selection-The process where organisms better adapted to their environment tend to survive and produce more offspring.
- Adaptation-A change or the process of change which an organism or species becomes better suited to its environment.
- Directional selection-A mode in which a single phenotype is favored, causing the allele frequency to continuously shift in one direction
- Disruptive selection-A mode in which the extreme values for a trait are favored over the intermediate values.
- Stabilizing selection-A mode where diversity decreases and the population mean stabilizes on a particular trait value
- Phenotype-The set of observable characteristics of an individual resulting from the interaction of its genotype with the environment.

THE THICKET GAME

OBJECTIVES

Students will: 1) define adaptation in animals; and 2) generalize that all animals are adapted to survive.

METHOD

Students become "predator" and "prey" in a version of "hide and seek."

BACKGROUND

NOTE: See "Seeing is Believing" and "Surprise Terrarium" for other elementary-age adaptation activities.

Animals are adapted to their environment in order to survive. Animals may be adapted to changes in their habitats. For example, snowshoe rabbits have a white winter coat to blend with a snowy environment and a tan summer coat to blend with summer ground and vegetation colors. Chameleons change color to blend with their surroundings. The walking-stick insect can look like a twig or stick. Fawns have spotted hair that resembles dappled light on the forest floor.

The major purpose of this activity is for students to understand the importance of adaptation to animals.

MATERIALS

blindfolds; outdoor area like a thicket or other vegetated area free of poisonous plants and other hazards where students can safely hide

Age: Grades K-6
Subjects: Science, Physical Education, Language Arts
Skills: Analysis, application, description, discussion, generalization, kinesthetic concept development, observation, psychomotor development
Duration: 30 minutes
Group Size: minimum of five students
Setting: outdoors
Conceptual Framework Reference: III.D., III.D.1., III.D.2.
Key Vocabulary: adaptation, predator, prey
Appendices: Outdoors, Field Ethics, Simulations

PROCEDURE

1. Take the class to a "thicket."
2. Blindfold one student who will be the "predator." The predator slowly counts to 20 while the other students or "prey" hide. Hiding students must be able to see some part of the predator at all times.
3. After counting, the predator removes the blindfold and looks for prey. The predator can turn around, squat and stand on tip-toe but not walk or change location. The predator should see how many students he or she can find, identify them out loud and describe where they are. When identified, the prey come to the predator's location and wait until the next round to become predators but do not tell the original predator where anyone else is hiding.
4. When the original predator cannot see any more students, a new round starts. All of the predators put on blindfolds. Predators should be in close proximity to each other. Each predator has the same motion restrictions that the original predator had. The original predator again counts aloud to 20. All the remaining prey must move at least ten feet closer to the predators. Those remaining prey still try to remain hidden. All the predators remove their blindfolds and take turns naming students they can see.
5. Play as many rounds as necessary until only one or two students are left hidden. At that time, have the remaining students stand up and identify themselves. It may be surprising how close the prey got to the predators without being detected. Both the ability to remain undetected and to detect others are examples of successful adaptations. Introduce the term "adaptation."
6. Do the activity one or two more times.
7. Discuss what made predators and prey successful. Were they quiet, clever, camouflaged, or good listeners? Ask students to identify animals that are adapted with similar characteristics to survive.

8. Ask the students how they could change to be more successful predators and prey. Some ideas that may come out are: changing color (clothes); wearing clothing that doesn't stick to plants; being smaller; climbing a tree. Ask the students if animals can make any similar kinds of changes.
9. Talk about differences between physical and behavioral changes. Have the students identify which survival and adaptations related to predators and prey are behavioral, which are physical and which involve both. Explain that physical and behavioral adaptations take time.
10. Ask students to summarize what they have learned. See if students can think of other examples of animal adaptations. Generalize that all animals are adapted to survive.

AQUATIC EXTENSIONS

1. It is not just animals on land that are adapted for survival in a variety of ways! Imagine an underwater thicket. What would be the same, if anything, about predator and prey relationships in an underwater thicket? What would be different, if anything? Draw two different underwater thickets—one in a pond and one in an ocean. Include pictures of fish and other aquatic life that are hardly visible because of adaptations that make them hard to see and pictures of others that are easy to see.
2. Identify predators and prey in two or more aquatic environments.

EVALUATION

1. Describe the importance of adaptation to animals. Give at least two examples of animal adaptation.
2. Create a play or skit that shows how both predators and prey are adapted to survive.