Date: March 1, 2023
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NYSSLS 5-E Lesson Planning Template

Grade/Grade Band:* 7/8	**Topic:** Adaptations/Evolution	**Lesson #** 1 in a series of multiple lessons

Lesson Title: Determining adaptations and features of success for the Eastern Gray Squirrel

Brief Lesson Description:

At the opening to our unit on evolution, students will circle the room in teams to look over squirrel artifacts - with a focus on identifying traits and behaviors that help squirrels either survive or reproduce.

Performance Expectation(s):

- **MS-LS4-4** Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

Specific Learning Outcomes: Students will be able to…

- Identify and list factors that will increase the probability of squirrel survival and reproduction.
- Explain the impact of biotic and abiotic features on the reproduction and survival of the Eastern gray squirrel

Narrative/Background Information

Prior Student Knowledge:

Before teaching this lesson students should have a background in both genetics and population dynamics. Students will understand that there is variation within a species due to genetic differences resulting from sexual reproduction. They will also understand the factors that will influence a population's ability to remain stable.

Science & Engineering Practices:	**Disciplinary Core Ideas:**	**Crosscutting Concepts:**
Analyzing and Interpreting Data	**LS4-4** Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. **LS4.B: Natural Selection** ● Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4) **LS4.C: Adaptation** ● Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6)	**Patterns** ● Patterns can be used to identify cause and effect relationships. (MS-LS4-2) ● Graphs, charts, and images can be used to identify patterns in data. (MS-LS4-1),(MS-LS4-3) **Cause and Effect** ● Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS4-4),(MS-LS4-6)

Possible Preconceptions/Misconceptions:

- An individual within a population can "decide" to adapt to their environment.

Teaching Materials:

- Squirrel kit from SUNY-ESF (squirrel skins & skulls & slides of fur coat)* If unable to get access to these kinds of materials, photos or videos can work as well. Some items might be accessible to borrow from your local nature center, a state department professional development resource or a local university.
- microscopes (2)
- laminated maps of squirrel distribution
- squirrel food evidence (chewed pine cones or walnuts)

Safety: General classroom management rules

LESSON PLAN – 5-E Model

ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions:

1. As students walk into the room, have the Mark Rober video cued up to play and visible on the screen. Many students have seen this and excitement builds as they file in!
2. Before playing the video, ask students to be watching carefully for different traits or abilities shown in the video that help a squirrel survive in the wild (and not just on a Ninja course).
3. Show the following youtube video from the 9:27 mark to the 13:23 mark:
4. Mark Rober Youtube Video: "Backyard Squirrel Maze 1.0- Ninja Warrior Course"
5. After watching the video, call on students at random (I prefer the popsicle stick method) to give "One trait or ability that helps a squirrel stay alive". If they say something simple like "the tail", prompt them to explain "and how does the tail help keep them alive?"

EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions:

1. Teams of 2-3 students will travel around the room to 10 stations. At each station they will need to identify either a trait or behavior that helps a squirrel either survive or reproduce.
2. If time allows, lead students in a recap discussion, making a joint list on the board of traits vs. behaviors that help a squirrel stay alive and reproduce.

EXPLAIN: Concepts Explained and Vocabulary Defined:

1. This step would be covered in subsequent lessons. This stage would include students listing the physical and behavioral traits that help squirrels survive and reproduce. We would ask students to hypothesize if the fur color could make a difference to the survival or reproduction of squirrels.
2. Students would then learn about the genetic basis for the color variation.
3. Using other case studies (moths?) students will learn about the mechanism of natural selection.

Key vocabulary that you will introduce/use: Adaptations, Variation

ELABORATE: Applications and Extensions:

- This step would include the SquirrelSpotter game.

EVALUATE:

- Students will write a C.E.R. (Claim-Evidence-Reasoning) paragraph using evidence collected from class (distribution maps and SquirrelSpotter experience/data) to answer the questions: “Why are there more black squirrels in the city?”

Differentiation/Modifications:

- An electronic copy may be shared with struggling readers if they need text-to-speech accommodations. They should still carry their chromebook/device around with them to each station so they can see the artifacts while their device reads the station out loud to them. Ideally, students will be practicing reading out loud and will be comfortable enough to ask for help sounding out and understanding difficult words.

References:

- Thorington, R. (2006) *Squirrels: The Animal Guide*. Johns Hopkins University Press.