Bay Area Scientists in Schools Presentation Plan

Lesson Name The Spice of Life: Variation Within Species
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Grade Level 3 **Standards Connection(s)** Variation of Traits, Biological Unity and Diversity

Next Generation Science Standards:
3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.
3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence • Construct an argument with evidence, data, and/or a model. (**3-LS2-1**) • Construct an argument with evidence. (**3-LS4-3**) • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (**3-LS4-4**) • Use evidence (e.g., observations, patterns) to support an explanation. **(3-LS3-2)**	*LS2.C: Ecosystem Dynamics, Functioning, and Resilience* When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to **3-LS4-4**) *LS4.C: Adaptation* For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all (**3-LS4-3**) *LS4.D: Biodiversity and Humans* Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (**3-LS4-4**) *LS3.A: Inheritance of Traits* Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. **(3-LS3-2)** *LS3.B: Variation of Traits* The environment also affects the traits that an organism develops. **(3-LS3-2)**	*Cause and Effect* Cause and effect relationships are routinely identified and used to explain change. (**3-LS2-1**),(**3-LS4-3**),**(3-LS3-2)** *Systems and System Models* A system can be described in terms of its components and their interactions. (**3-LS4-4**)

Common Core Standards:

ELA/Literacy:

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-1)

SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4-3,(3-LS4-4)

FOSS Connections:

Grade 3 Module: *Structures of Life*

Investigation 3: *Meet the Crayfish*

Teaser: It's easy to look around your classroom and see how different you look compared to your classmates. There are certain things that make you unique! The same goes for other animals. In this lesson, we will learn more about how variations in animals can help (or hurt) them over time.

Objective: As a result of this lesson, students will learn about genetic variation and how it can sometimes help an animal and it can sometimes hurt an animal as well as the different ways animals camouflage themselves. They will also learn that changes in the environment can change how species adapt.

Vocabulary/Definitions:

Adaptation: process by which an animal or plant changes to fit into its environment
Environment: the surroundings in which an animal or plant lives
Species: a class of plants or animals of the same kind and with the same name
Camouflage: hiding by blending in with a background
Predator & Prey: A predator is an animal that eats another animal. The prey is the animal that gets eaten by the predator.
Variation: any difference between individual organisms, or groups of organisms of any species caused either by genetic differences or by the effect of their environment

Materials:

We will bring all of the materials for the stations as well as pictures for the topic introduction.

What should students have ready (pencils, paper, scissors)?

Students should have pencils ready

Classroom Set-up:
The students will start the lesson as a whole group but will be put into small groups for the first activity and then go to one of three stations. We will need a place to hang posters and would prefer the desks to be arranged in small groups.

Classroom Visit

1. **Personal Introduction:** **___3____ Minutes**
   Hello everyone! We are scientists from UC Berkeley and we study animals.
   [*each scientists introduces themselves individually*]

   Topic Introduction: **__10____ Minutes**
   We are going to talk about differences between animals in a species. Who can tell me an example of a species? [take ideas] We are going to work in groups to look at differences between birds
   [Students work in groups of 3 or 4. Each group gets a different set of birds (can have repeats if necessary). Each set has drawings of four individuals that vary in some way.
   Sets include:
   Long-tailed widowbird (tail length)
   Blue grosbeak (color)
   Hummingbird (bill length)
   Rock ptarmigan (camouflage)
   Raptor (body size)
   Albatross (wing length)]

   Group questions:
   How do these birds vary?
   What do you think are some good and bad things about looking like bird number 4 instead of bird number 1?
   What kind of environment does your bird live in?
   What might happen if the environment changed?

   We will go around and give hints and help get them thinking in the right direction.
   At the end of this exercise we will ask for groups to present their bird to the class, explain the variation they have found, and share their ideas about why this could be good or bad. As they go we will sum up the important concepts that are brought up.

2. **Learning Experience(s):** **____30___ Minutes**
   Station 1: Predator Eyes

We will have two big laminated posters, one with a jungle scene, one with a grassland scene. Laminated birds, flowers, snakes etc. attached to them. Students take turns being predators. The

predator turns his/her back to the poster while we add/remove/move some of the birds and they get a piece of sheer fabric tied over their eyes. Then they point out the birds they see and we mark them with a post-it. Some birds are made to blend into the background, others not. After half the group has gone, we switch backgrounds (the same types of birds are used on both). Now some of the birds that were obvious on the first background should be the ones that blend in. Discuss which birds were easier to see on each of the backgrounds and why.

Station 2: Camouflage Coloring

Show 3 photos: One of a well-camouflaged creature, one showing some type of mimicry (owl butterfly?) and one poison dart frog. Explain the three different strategies. Then students each get a paper with an outline of a bug. Ask them to select one of the three strategies and color in the bug and its background. If students finish early they can get another sheet and choose a different strategy.

Station 3: Food Challenge

Containers are set out with three different types of "food": big beads, beans, and worm fishing lures. There are three tools for picking up this food: tiny plastic spoons, large unbent paperclips (with one curve left in) and tweezers. Talk about different bill types and how some bills (and feet) are better for some types of food. Ask the students to predict which of their tools will be better for each type of food. Run trials where they get a set time to pick out as much food as possible from a bowl (need to work out the exact timing/logistics of this). Record how well each tool does for each type of food after every round. Were the predictions confirmed?

3. Wrap-up: Sharing Experiences **_____5__ Minutes**

Who can tell me what you learned in Station (1,2,3)?

Why do you think it's important for animals to adapt quickly?

In Station 3, you learned that some animals get more food than others. If they get more food, they will have enough to feed their babies. How do you think that will help them and their special adaptation?

4. Connections & Close: **____5____ Minutes**

What did you learn today?

Clean up and say goodbye

Total 50 – 60 Minutes

Follow-up – After Presentation

Natural Selection – **Peppered Moth Activity (pg. 5)** from Bioscience for the Future
http://www.bbsrc.ac.uk/web/FILES/Resources/darwin-2009-activities.pdf#page=5

Reading Connections:

- Where Else in the Wild? By David M. Schwartz and Yael Schy – This volume is ideal for introducing a unit on survival strategies or for extended discovery at a classroom station. The adaptations of both predators and prey are included, so the book can also be used for lessons

in food webs, habitats, and life cycles.
http://www.nsta.org/recommends/ViewProduct.aspx?ProductID=19794

- Why Are Animals Blue? By Melissa Stewart – The books in the *Rainbow of Animals* series use vibrant colors and fun facts to take readers through the world to explain how color helps creatures survive. Each volume provides a beautiful introduction to animal adaptations using a concept to which children can relate.
http://www.nsta.org/recommends/ViewProduct.aspx?ProductID=19119

Five Fingers of Evolution (TED-Ed video by Paul Anderson and Alan Foreman)
http://ed.ted.com/lessons/five-fingers-of-evolution