Fall/Spring - Outdoor | 45 minute lesson

Adaptation Comparisons

Connected Next Generation Science Standards

3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Featured Science and Engineering Practices

Constructing Explanations

Featured Cross-Cutting Concepts

Patterns

Materials

- For teacher - small white board and markers
- Magnifying glasses
- Cup, jar, or other container for collecting organisms
- Journal or Venn Diagram worksheet

Overview

Adaptations are inherited traits (structures or behaviors) that help an organism survive in its environment. Traits are passed down from parents, so the more similar two organisms appear, the more closely related they probably are! In this lesson, students will be scientist detectives as they explore similarities between two plants and make inferences about how closely related they are based on the organisms' traits.

Students will

- Use patterns in plant structures to infer relatedness.
- Understand that all organisms are related.
- Compare and contrast plants and organisms.

Teacher Preparation

- Identify two similar, but different trees or plants in the garden space to use for the introductory activity.

Guiding Question - How are organisms (living things) similar to their parents?

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Setting

- School garden or green space where students can observe a variety of living organisms.
- Can be taught at any time of year, but in colder months, animals will be harder to find.

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Explore

- Ask students in the garden area, What are some things that all organisms (living things) have in common?
- Draw students' attention to two different trees or plants. The two examples should be closely related but different species. Make two columns on a white board. Point to the first plant and ask students to identify some structural characteristics of this plant. Popcorn responses and list in one column.
- Next, point to the second plant and ask for characteristics of this plant. Popcorn and write down responses in the second column.
- Ask students if they see any similar characteristics between the two plants. As students share out, draw a line connecting the same traits from column 1 to column 2 to give a visual representation of the characteristics the plants share, as well as those they do not.
- Have students turn and talk with a neighbor: Which of these characteristics did that plant inherit from its parents? Discuss student ideas and cross out traits that plants were not born with.
- Tell students that today they are going to be scientist detectives and look for similar characteristics, or traits, between organisms.
- In pairs, students will find two plants in the garden area that are different but similar (e.g. lettuce and kale, oak tree and maple tree, or asters and coneflowers). They should try to find the two plants that look the most similar (without being the same species). They will observe and record the similarities and differences between the plants.

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You may want to split the class in to two groups, and instruct half of them to focus on plants like trees or shrubs and have the other half focus on plants in and around the garden like crops and native flowers.

Taxonomy is the science of naming, describing, and classifying organisms. Species and family are two **taxa** (categories) used by scientists to group plants with similar characteristics. Each species belongs to a family.

When working in the garden, it is helpful to know the family relationships among plants, because different species that belong to the same family often share the same problems and require the same care! For example, cabbage and kale both belong to the Brassica family, and both are particularly susceptible to harlequin bugs. This is why gardeners and farmers practice **crop rotation** and **companion planting**.

In other words, the more diversity within a garden, the healthier it will be!

- Students either create a Venn diagram in their garden journal or pass out the Adaptation Comparisons worksheet.
- Brainstorm how to make close observations and review any boundaries or expectations.
- Walk around and assist students in choosing plants or noticing details. Pass out magnifying glasses, if available.

Digging Deeper

- Allow students at least 10 minutes for observations and bring the students back together before they lose interest.
- Quickly go around the group and have each pair share one similarity and one difference between the plants they observed.
- Do they think plants receive these similar traits from parent plants(inherited). Why? Or why not?
- Explain that scientists look for patterns (similarities) in organisms to see how closely related they are. The more similarities plants have, the more closely related they are.

Making Connections

- Scientists frequently have to argue and explain the patterns they observe.
- Combine pairs of students into groups of 3-4 pairs.
- In small groups, the student pairs will argue that the plants they observed were the most closely related plants based on their Venn diagram. Tell them to use evidence of patterns to support their argument.

Adaptation Comparisons

This lesson also pairs well with planting or weeding. How are the seedlings similar and different? What traits help the weeds take over garden beds?

- Circulate and listen to students discussions and arguments, probing for more information as needed.
- Bring the class back together and have one student from each group share the results of their discussion.
- Pick a few traits from one set of similar plants. How do those traits help the plant survive?
- While walking back into the classroom (or as a possible writing prompt) ask students to reflect on the following questions: What do you have in common with other organisms? What makes you unique?

This lesson structure was influenced by the "Related and Different" lesson by BEETLES™ at The Lawrence Hall of Science, http://beetlesproject.org

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