



## Colorful Animal Adaptations: Create a Critter

### INTRODUCTION

This lesson explores how color and patterns serve as adaptations for survival in the natural world. Students will examine several examples of how animals use various visual stimuli for protection or as camouflage. Students will then demonstrate their understanding of the many ways color and pattern are used in nature by designing their own animal with adaptations to the school garden environment, or environment of the facilitators choosing.

### LESSON OVERVIEW

**Grade Level & Subject:** Grades 3-5 Science and Art

**Length:** 1 class period

#### Objectives:

After completing this lesson, students will be able to:

- Understand how organisms relate and adapt to their environment
- Understand why those adaptations are important
- List and explain several examples of adaptation, including color related adaptations
- Explain how color is used as an adaptation through their own illustrations and writing

#### National Standards Addressed<sup>1</sup>:

This lesson addresses the following National Science Standards from the National Academies of Science, and Project 2061 from the American Association for the Advancement of Science:

- Content Standard: **NS.K-4.3 Life Science As a result of activities in grades K-4, all students should develop understanding of:**
  - The characteristics of organisms
  - Organisms and environments
- Content Standard: **NS. 5-8.3 As a result of their activities in grades 5-8, all students should develop understanding of:**
  - Structure and function in living systems
  - Diversity and adaptations of organisms

#### Materials Needed:

- Overhead projector/Smartboard
- Construction paper/drawing paper
- Markers/crayons/colored pencils/water colors etc.

#### Supplemental Materials:

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<sup>1</sup> <http://www.educationworld.com/standards>

- Mixed media art supplies (yarn, fabric, wrapping paper, cardboard, paint, clay, etc.)
- Laminated images to use with students working in groups. (See attached images.)
- Online photos/video of color related animal adaptations to show the entire class before the activity (See Resources.)

#### Assessment:

Students will be assessed through the following activities:

- Participation in class discussion and brainstorming activity
- Illustrating the concepts of pattern, mimicry, color-matching and bright coloration in designing their own animal to survive in the garden habitat.
- Written description of how their new animal has used color to adapt to their habitat.

## LESSON BACKGROUND

#### Relevant Vocabulary:

- **Adaptation:** to adjust or change to surroundings helping an organism better fit its environment
- **Camouflage:** the hiding or disguising of an organism by covering it up or changing the way it looks
- **Coloration:** the arrangement of color on an organism
- **Habitat:** the place or environment where an organism normally lives and grows
- **Mimic/Mimicry:** when one organism looks and/or acts like another
- **Pattern:** a set of characteristics that are repeated (numbers, images, colors, shapes etc.)
- **Symmetry:** close agreement in size, shape, and relative position of parts on opposite sides of a dividing line (bilateral symmetry, like the human body or a butterfly) or around a central point (radial symmetry, like a starfish)

#### Background Information:

The diversity of life on our planet is staggering. Much of that diversity can be attributed to the diverse **habitats** that cover our planet. **Adaptation** is the process by which organisms become well-suited to a habitat over many generations. These characteristics help an organism to survive in a particular habitat. Adaptations can be behavioral (how an animal acts) or physical/structural (how an animal looks, sounds, or smells). Behavioral adaptations could be an opossum playing dead because predators less likely to attack/eat a dead animal, or birds migrating south for the winter because they are not well-suited to living in colder climates. Physical adaptations—the focus of this lesson—are just as diverse. Molting as the seasons change, having a thick layer of blubber, having webbed feet, being striped or spotted, smelling funny, having brightly colored skin, being able to carry water in a hump or looking like something else in the environment are all types of physical adaptations.

**Camouflage** is one type of physical adaptation. For example, polar bears fur appears white to blend into their snow-covered habitat of the Arctic Circle<sup>2</sup>. When an animal matches the color of their environment predators must expend more energy searching for them; alternately, predators

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<sup>2</sup> Polar bear fur is not actually white; it just appears this way. Their fur is comprised of a guard coat and an undercoat, the hairs of which are all transparent. Polar bears look white because these transparent hairs reflect the visible wavelengths of light back to us—much like the snow and ice of their natural habitat—giving them the appearance of a white coat of fur. (“About Polar Bears: Fur and Skin.” Polar Bears International. <http://www.polarbearsinternational.org/about-polar-bears/essentials/fur-and-skin>)

who match their environment in this way are not as easily detected by their prey. Animals like tigers and owls also blend with their habitat because they have a **patterned coloration** that allows them to blend in like the solid white polar bear. Being camouflaged allows predators to be more successful hunters.

Another example of adaptation is **mimicry**. Mimicry is when one organism disguises itself as another organism, or as a part of the habitat. For example, the many varieties of leaf insects and praying mantis look so much like the leaves they live on it is often difficult to detect them. Warning coloration is yet another type of adaptation, but unlike camouflage it brings attention to the organism, rather than hiding it. Butterflies are sometimes brightly colored to warn that they are poisonous, and thus deter birds from preying on them. There are also instances of harmless animals, like the scarlet king snake, whose adaptations give it an appearance remarkably similar to its poisonous relative, the coral snake. Bright colors are also how flowers attract attention, but the purpose here to not scare away a predator, but to attract the pollinators necessary for reproduction. Every organism has developed a specific set of adaptations which allows it to thrive in its natural habitat. Understanding the purpose of these adaptations will help students recognize the relationship between animals and their environment and how ecosystems thrive.

### Resources:

- **Nature – Wildlife: Habitats** *BBC*  
<http://www.bbc.co.uk/nature/habitats>  
Photos and information on habitats
- **Education –Encyclopedia: Adaptation** *National Geographic*  
<http://education.nationalgeographic.com/education/encyclopedia/adaptation/>  
Photos and information on adaptation
- **Education – Encyclopedia: Camouflage** *National Geographic*  
<http://education.nationalgeographic.com/education/encyclopedia/camouflage/>  
Photos and information on camouflage

### Preparation:

Prior to this lesson, select several images from Resources section above to illustrate real life examples of coloration as adaptation. If no projector or Smartboard technology is available, printed copies of selected images will also work. Have these examples ready to show with Activity 1. Example photos are also provided with this lesson

## LESSON STEPS

### Warm-up:

1. Begin by asking who knows what a habitat is.
  - a. Ask students to name different kinds of habitats (forests, grasslands, lakes/ponds, streams, ocean, desert, polar regions, etc.) Create a class list.
  - b. Ask students to list some different characteristics of each habitat.
    - i. Cold, no trees, white as the dominant color in the tundra; hot, scarcity of water and lots of sand in the desert; cool, lots of trees and green plants in the forest, deep cold salty water of the ocean, etc.

- c. Now ask students to list some animals they might find in these habitats
  - i. Why do these animals live in these certain habitats? Why don't zebras live in the ocean? Why don't grasshoppers live in the arctic?
2. Introduce the concept of adaptation. *Over a very long time, animals have adapted to their habitat by developing the best way to protect themselves, find food, and cope with the conditions of their environment.*
  - a. Explain that the class is going to learn about how the colors of animals help them adapt to their habitats.

### Activity One: Understanding colors as an adaptation

1. Ask several students to name their favorite animals and have them explain how that animal's coloration helps them survive in their natural habitat. Develop a short list of examples of several different kinds of adaptations related to color. As examples are given, project your selected examples to class.
  - a. What animals can we think of that have coloration that makes them stand out?
  - b. Why would an animal want to stand out?
    - Bees are bright yellow to warn predators that they are dangerous, and can cause them pain. (Example of warning coloration.)
    - Butterflies and moths sometimes have big spots to make them look like a bigger, more dangerous animal like an owl. (Example of pattern coloration)
2. What animals can we think of that are colored in a way to keep them hidden?
  - a. Why would this keep them safe? How could this help them catch prey?
    - Leaf insects look like the leaves they eat, making them hard to distinguish from the actual leaves. (Example of mimicry)
    - Leopards are spotted to help them blend into their habitat, so they can sneak up on prey. (Example of pattern coloration)
    - Coral snakes have distinctive yellow and red markings to warn that they are poisonous; the harmless scarlet king snake mimics the coral snake's coloration so predators will think it is also poisonous. (Example of how warning coloration is mimicked by other species)

### Activity Two: Create Your Critter!

1. Now that students have had a chance to brainstorm about how color is used as an adaptation, ask them to think about their school garden as a habitat for animals.
  - a. What kinds of characteristics does the garden habitat have?
    - i. What are the primary colors?
    - ii. Does the habitat change with the season?
    - iii. What kind of food is available?
    - iv. *Encourage students to think about the specifics of their garden.*
2. Explain that they will be drawing a new, imaginary animal that uses color to adapt to the garden habitat. Their animal can be like others they know, or it can be completely different. Tell students to be as creative as they can with their new animal, but to use colors/patterns as an adaptation to blend in, scare off predators, attract prey or protect themselves in the garden habitat.

3. Have students include a detailed description of their animal adaptations on the back of their drawing. (Note: Older students might want to invent a new habitat – on a different planet or in the future – for their imaginary animal to exist in. Those students should also create a list of characteristics for the new habitat to which their animal has adapted.)

### **Activity Three: Share your critter – Animal Profiles**

1. When students have completed their drawings, ask for several volunteers to share their animals with the class.
  - a. Ask students to first explain what their animal is, if it has a name, and then what adaptations it has.
  - b. Follow-up by asking how those adaptations will help this new animal survive in the garden.

### **Wrap Up: Review of concepts**

1. Review the concept of adaptation by asking for examples from student drawings of mimicry, use of patterns, warning coloration, and matching coloration.
  - a. Have students pass their drawing to the person next to them. Ask students to explain the best/most effective adaptation of their classmate's animal.

### **Extensions:**

- Include a trip outside to the school garden to observe first-hand what kinds of insects, animals and plants make up the garden habitat. Have students draw outside, using the garden for inspiration.
- Compile all drawings to create a visual display on the classroom wall of who lives in this particular garden. As a group project, have students use the profiles and artwork of each animal to create a new food web for this imaginary habitat.
- Have students write a short essay about their new animal, and what would happen to it if it were to be transported to a different habitat, or if the current habitat were to change over time.

## **CONCLUSION**

In completing this lesson, students will grow their science content knowledge of natural habitats and adaptation, specifically how physical adaptations like coloration help animals survive. Students will develop their communication and analytical skills by applying their understanding of key science concepts to the creation of a new animal, and presenting their work to the class. This lesson will prepare students in elementary school for middle and high school study of biological evolution, natural selection and adaptation.

## **LESSON PLAN CREDITS**

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## Examples of Coloration as Adaptation



Leaf insect: Mimicry

Sourced from: [http://farm7.staticflickr.com/6184/6116539263\\_aa9b688dce\\_z.jpg](http://farm7.staticflickr.com/6184/6116539263_aa9b688dce_z.jpg)



Coral Snake: Warning coloration

Sourced from: [http://www.edupic.net/Images/Reptiles/coral\\_snake1091.JPG](http://www.edupic.net/Images/Reptiles/coral_snake1091.JPG)



Monarch Butterfly: Warning coloration

Sourced from: <http://pics.tech4learning.com/details.php?img=046.jpg>



Screech Owl: Camouflage by pattern

Sourced from: <http://pics.tech4learning.com/details.php?img=screechowl.jpg>



Tiger: Camouflage by pattern

Sourced from: <http://pics.tech4learning.com/details.php?img=tiger212.jpg>