

Color Crazy

How **does color** make it **easier to survive**?

Project **WILD**

Grade Level: Lower Elementary, Upper Elementary

Content Areas: Science, Language Arts, Expressive Arts, Environmental Education

Method: Students create representations of wild animals designed to blend into their habitat.

Materials: Natural materials such as sticks, leaves, pinecones, acorn shells, etc.; modeling clay; pictures of brightly colored animals such as fish found living around coral reefs, tropical birds, and insects; **OPTIONAL:** art supplies, including crayons, paint, chalk, construction paper, scissors, glue, chenille stems and pony beads in an assortment of colors; other brightly colored materials like artificial feathers and tissue paper

Activity Time: one or two 45-minute session(s)

People Power: any

Setting: indoors or outdoors

Conceptual **Framework** Topic **Reference:** WP1A2; CA11A

Terms to Know: wildlife, camouflage, mimicry, adaptation, predator, prey

Appendices: Early Childhood Extensions

Objectives

Students will 1) generalize that wildlife exists in many colors, 2) make inferences about the relationship between wildlife coloration and the colors and patterns found in an animal's habitat and 3) discuss coloration of wildlife as an adaptation for survival.

Background

Animals use coloring and markings as survival tools. For example, animals use color as protection and as a way to attract mates. The colors that humans see are not always the same colors that all animals see. An animal's bright colors may not be visible to its primary predators.

Camouflage, or the ability to blend with surroundings, can determine whether a prey species, like a rabbit, remains hidden from a predator or is easily identified, killed, and eaten. Predators such as bobcats and trout have camouflaged bodies so that their prey will not see them. Some animals go through

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seasonal color changes to remain camouflaged. For example, ptarmigans are ground-dwelling birds that live in arctic and alpine regions of the Northern Hemisphere. In winter, White-tailed Ptarmigans are white and blend with the color of the alpine tundra. In summer, they turn mottled brown and resemble the color of the alpine forest during that time of year.

Many animals are brightly colored. The eastern newt in its land-dwelling juvenile, or eft, stage is a bright red salamander. The red color warns predators that the newt's skin contains a compound that can be toxic or irritating to the predator. A predator that eats a newt learns to avoid newts in the future. Bright colors or other markings also may serve as a defense. Some animals use color to appear to be something that they are not. Polyphemus moths have giant eye spots that create the impression that the animal is larger than it really is. Color also plays a role in animal mating rituals. The brightly colored male scarlet tanager and peacock both use color to attract mates.

Wildlife exists in a wide range of colors that are linked to their survival.

Wildlife uses colors as a physical adaptation to increase their chance of survival in their surroundings. There are a variety of ways colors are used, including the following:

1. Concealing coloration/background matching – the use of any combination of

materials,

coloration or illumination for concealment, either by making animals or objects hard to see

2. Disruptive coloration - the outlines of an animal are broken up by a variety of colors
3. Disguise - used to camouflage, or blend in with their background
4. Mimicry - two species share common colors in order to help one or both species survive
5. Warning coloration or aposematism – usually conspicuous or bright markings on a prey species
that warn predators of the prey's defensive qualities
6. Countershading - an animal's pigmentation is darker on the upper side and lighter on the
underside of the body. This form of camouflage counteracts the effects of light from the sun brightening the upper side of the body; in this way, the animal is more difficult to detect.

Procedure

1. Open the discussion by asking students to name and describe real, brightly colored animals. Show students photographs of a variety of brightly colored animals. Discuss how the animals have physically adapted to use colors and markings to help them survive. In addition to bright colors, how do more subtle shades of colors help animals? How do the arrangements or patterns of colors help a particular species of wildlife? Use the information in the background section to explain different ways that coloration aids animals in survival and, depending on the level of the students, you may want to explore in detail the various adaptations associated with coloration.

2. Collect natural materials (sticks, leaves, pinecones, etc.) before the class, or with the students outside. In partners or small groups, have the students use these materials to make a creature. Clay can be used as a substrate to hold the materials together. The students can make birds, reptiles, amphibians, insects, fish, and mammals-whatever wild animal they would like. Make sure the students

will be able to describe how the coloring on the animal would help it to survive.

3. Once the creatures are constructed, take the students outside and ask the student pairs or small groups to place the creatures in appropriate habitats (e.g., birds can be placed in trees, gophers in a hole). Make sure the groups are not able to see where the other groups are putting their creatures.

NOTE: If the conditions outside are not favorable, try to hide the creatures by selecting the best available background indoors. For example, an animal might blend in with a poster or fake foliage.

4. As a group, go on a nature walk with the students to find each of the creatures. Once the group sees each creature, the student who constructed and hid the creature can describe what type of animal it is and how it uses color to survive.

5. Ask students what they have learned about wild animals. Encourage the generalization that wild animals occur in a variety of colors and that animals' colors and markings help them survive.

Extensions

1. With younger students, have them use art supplies to draw, paint, or construct colorful creatures that portray real wild animals. What primary colors can be found? Display students' art in a colorful "Wildlife Exhibit." Students can use reference books or web sources to find images of real animals similar to the ones they created. Can they find "rainbow" animals that have three or more distinct colors on their bodies? How does the coloring of each animal help it survive?

2. Place animal pictures created by students or animal pictures from other sources beside pictures of the animals' natural surroundings. Look for animals that blend in and for those that stand out.

3. As an alternative or additional option to using only natural materials in Procedure Step 2, have students use chenille stems and pony beads to create their colorful wild animals. The animals can be camouflaged, use warning colors, or colors for attractants.

Aquatic Extensions

1. A coral reef is one of the most colorful places in the world. Find pictures of reef fish or other reef animals. An online video or a tropical fish tank in a pet store or aquarium would also show the diversity of colors found in coral reef animals. Pick a picture of a colorful animal that lives in a coral reef. Think of at least one way its color might help the animal survive in its environment. Using brightly colored crayons or other art materials, create a colorful reef animal. Then draw a picture of it in its habitat.

2. Research light extinction in water, or how the loss of light in water affects the visible light spectrum and colors seen at certain depths. Find out, for example, why bright red fish are camouflaged. Then design a fish based on the depth of its aquatic habitat. View the fish through appropriately colored cellophane or plastic to simulate the effect of its camouflage.

Evaluation

1. Have students explain their creations and elaborate on why the coloration of the animal they constructed should help it survive. Why would the animal not survive as well if it had a different coloration or markings?

2. Identify a wild animal that is red or has red markings on its body. Identify two wild animals that are brown or have brown markings on their bodies. Identify one animal that is yellow or has yellow markings, one that is blue or has blue markings, and two that are green or have green markings on their bodies.

3. Create a model or picture of a colorful butterfly or moth and place it in the room. Explain how the colors will help it survive. Explain where in the room its chances for survival would probably be best.

WILD Work

What's the difference between an **Ethologist** and an **Entomologist**? Why might they both be interested in animal coloration? Start researching the answers to these questions with students by going to www.projectwild.org.

In Step with STEM

Biomimicry means learning from the structures and systems found in nature to solve human problems. How have scientists mimicked camouflage to solve human challenges? What animals have scientists studied to replicate camouflage? For web links with more information about biomimicry of

cephalopods and other organisms, visit www.projectwild.org

Does the color of an animal help it absorb or reflect heat? A simple experiment can help determine if certain colors absorb heat better than others. Using red, white, black and yellow paper, construct five-sided paper boxes large enough to hold an ice cube. Place the paper boxes outside on the ground on a sunny day. Make sure the open side is facing away from the sun so that students can see inside the box. Place an ice cube inside each box and measure the time it takes each cube to fully melt. Compare the results. Research how this concept applies to animals. Studies have shown that animal coloration does affect heat absorption, but other characteristics of the animal's covering (such as coat or feather structure, or how hairs interact with light) play a more significant role in absorbing or reflecting heat.

Activity Links

General websites about camo:

http://education.nationalgeographic.com/education/encyclopedia/camouflage/?ar_a=1

<http://927235702511828638.weebly.com/camouflage.html>

Video of researchers studying camouflage:

<http://www.theguardian.com/science/grrlscientist/2014/aug/29/secrets-of-animal-camouflage-research>

Teach Engineering Curriculum for K-12 Teachers - Hands-on Activity: Do Different Colors Absorb Heat Better?

https://www.teachengineering.org/activities/view/colors_absorb_heat_better

Ask Nature Nuggets: Octopus and Cephalopods <https://youtu.be/DJtxG9YiA2g>

ScienceDaily – New 'Invisibility Cloak': Octopus-inspired camouflage systems automatically read surroundings and mimic them:

<http://www.sciencedaily.com/releases/2014/08/140818204118.htm>

Ethology and Coloration – Octopus vulgaris Camouflage Change

<https://www.youtube.com/watch?v=JSq8nghQZqA>

Amazing Behavior of a Moth for Camouflage:

<https://www.youtube.com/watch?v=QKgn0dNpopU>

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