

Camouflage and Coloring

Common Core Standards

ELA Literacy
RST.6-8.9
CCRA.SL.3

Vocabulary

- Adaptation
- Antipredator adaptation
- Camouflage
- Crypsis
- Disruptive coloring
- Aposematic

Summary: Students learn about defense mechanisms of wildlife in the context of predator-prey relationships and camouflage in their environment.

Time: 1 hour

Grade Level: 3rd - 6th

Note: The associated activity is appropriate for all ages, enjoyed even by adults.

Goals

- To deeply examine species' adaptations in relation to their environment.
- To enrich classroom learning with a structured outdoor play activity.

Learner Objectives

Students will... .

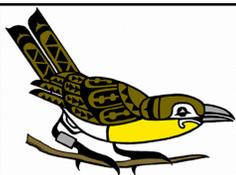
- Students will discuss different animal adaptations for predator defense
- Students will learn about visual mechanisms for defense in the context of the surrounding environment and animal perception
- Students will participate in a predator-prey simulation game to demonstrate camouflage

Materials

- Camouflage and Coloring (bird examples) sheet (for use with an overhead projector or as a student hand-out)
- *Optional:* additional pictures of animal camouflage examples

Background Information

An **adaptation** is a characteristic of a species (e.g., behavioral, physical) that enables it to survive in its natural environment. Adaptations develop and change over time, through the process of evolution. Predator-prey relationships exert a strong influence on whether individual animals survive, and thus there are numerous adaptations that prey have to avoid predators, as well as adaptations that predators have to capture prey. Prey animals have evolved characteristics to escape predators that are called **antipredator adaptations**. Antipredator adaptations include ways to prevent being sensed by predators, as well as to prevent being captured, attacked and eaten. Individual prey may escape being seen by predators through hiding, flocking together, or being active at specific times when predators are not abundant. The following lesson will focus on visual ways in which prey “trick” the eyes of predators



Camouflage and Coloring

Background Information continued

Camouflage refers to how animals are able to blend into their environment. Camouflage may be achieved in multiple ways. Through **crypsis**, animals may resemble patterns of the visual background. For example, crypsis occurs commonly in lizards whose scales can change color to match a desert background of rock or sand. Sometimes among birds the male of a species is brightly colored, and the female is of cryptic coloring. This allows for the female to camouflage during such activities as incubating eggs and protecting fledglings.

Many lizards' scales contain cells with chromatophores.

Chromatophores are a component of a cell that contain pigments and reflect light, sometime enabling the animal to rapidly change color. Chromatophores can be found in amphibians, fish, reptiles, crustaceans, cephalopods and bacteria. Some lizards, such as the Western Fence Lizard, change color throughout the day to not only hide from predators, but also to maintain their body temperature. Darker scales in the morning allow the lizards to absorb sunlight and remain warm, while lighter scales in the afternoon sun prevent overheating.

Another method of camouflage is **disruptive coloration**, in which an animal contains patterns and coloration that serve to visually disrupt a viewer from seeing the contour lines or outline of the animal's shape. The parts of the animal which are conspicuous, serve to distract a predator's attention. An example of disruptive patterns is the spots of a leopard, which help to break up the overall body shape. In birds, disruptive coloration can be seen in birds with strong contrasting colors like the black and white bands of a killdeer's neck.

A third way camouflage may be expressed is through **mimicry**, by which an animal takes on the appearance of another organism or part of its environment, sometimes known as "masquerade." This method of hiding is commonly seen in insects, for instance those mimicking a stick or a leaf.

In contrast to a strategy of being hidden, there are animals which are brightly marked with the intention of standing out.

Aposematism is the method of being obvious as a warning to predators, often coupled with being poisonous. For example, this may occur in poisonous frogs or insects.



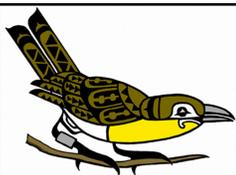
The nocturnal Lesser Nightjar relies on crypsis to help avoid predators while sleeping on tree limbs during the day.

Photo © 2013 Jim Livaudais



The Killdeer's alternating black and white bands are an example of disruptive coloring, helping to break up the outline of the bird and make it more difficult to see against a background.

Photo ©2013 Jim Livaudais



Camouflage and Coloring

Getting Ready

- Read over the background information
- Prepare to use an outdoor space that is open, yet contains an abundance of things for students to hide behind (e.g., a playground, a field with bushes, an open forest area)

optional: Prepare or ask student to find pictures of local animals that demonstrate elements of camouflage

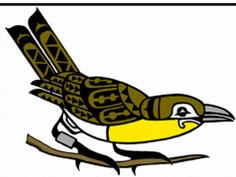
Discuss!

- Define “Antipredator adaptation” and ask students to think of different ways that prey avoid being detected by predators. Encourage students to be specific, using examples from things they have seen or even imagining themselves as a predator.
- As students come up with different examples, record their answers in a T-chart of “Antipredator Adaptations” with category headings; *Visual adaptation* or *Other adaptation*. After students contribute a few ideas to both sides of the T-chart, tell student that they are going to learn more ways which animals can avoid predators with coloring and patterns. List and define; *Crypsis, Disruptive Coloring, Mimicry, Aposematic*.
- Discuss background information, using example pictures from the Camouflage and Coloring sheet examples or pictures that students have gathered prior to the class.
- Tell students that they will now participate in a game that will simulate predators and prey interacting in the environment. Tell them to keep this question in mind while they play: *Who in this game represents the predator and who represents the prey?*

Investigate

Lead students outdoors to the space for the game. Remind students of the question to keep in mind for the game: *Who in this game represents the predator and who represents the prey?* Choose a center location for the game, one which serves as a good vantage point and is centered among the hiding spots. Ask students to stand by you as you go over the instructions for the game:

1. One student will stand in the center and count to 30 without looking as the other students disperse and position themselves in a hiding, or “camouflage” location. The person in the middle cannot move from the center location, but is free to turn in any direction. The object of the game is for the person in the middle to call out as many others as he/she can see.



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Investigate continued:

2. After the student in the center counts to 30 and uncovers his/her eyes, the student may “call out” anyone that can be seen. If a student is called out, they must come back to the center and sit quietly for the rest of the round. Students who are out cannot assist the person in the center.
3. The student in the middle will announce the first of three commands: ANIMAL NOISES!, which initiates all those in hiding to yell out an animal noise of their choice. The student in the middle may continue to call out any other students he/she can see.
4. The student in the middle will announce the second of three commands: NUMBERS!, while holding up one or two hands with any number of fingers up. The student should turn all the way around while holding up a number so that all those in hiding may see it. The students in hiding must remember this number. The student in the middle may continue to call out others that he/she can see.
5. The student in the middle will announce the last of the three commands: CAMOUFLAGE!, which signals for all those left in hiding to come running back to center. The first student to tag the student in the center on the shoulder and yell the correct number (from the second command) is proclaimed winner. Winner has first choice of becoming the center person for the next round.

Teacher tip: Make students aware of any potential hazards in the area, and designate boundaries. (You may choose to note to the students that one secret of winning the game is choosing a hiding spot that is not too far away from center). Play the game!

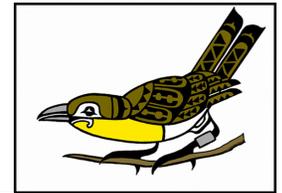
Conclusion

1. After a few rounds call the student back to center and ask them to debrief their experience. What made students successful at hiding? What allowed the student in the center to be successful?
2. Ask students to vote whether they thought the “hidiers” were predators or prey. Also, take a class vote as to whether the person in the middle was a predator or prey. Call on a few students to give their interpretations, as well as a statement to support their reasoning.
3. After the class has discussed their thoughts, tell the students to think about how *everyone* in the game could be *either* predator or prey. Both predators and prey can use similar tactics of stealth, hiding, being quiet, careful listening, visual scanning of the landscape, stalking etc...

Further Resource For more information regarding colorful birds and their plumage see the Cornell Lab of Ornithology’s webpage:
http://www.birds.cornell.edu/AllAboutBirds/studying/feathers/color/document_view

Name: _____

Date: _____



Camouflage and Coloring in Birds

Cryptic coloring can be found in bird species of all different kinds.



The **Fox Sparrow's** brown speckles help it camouflage while nesting in brushy areas and along forest edges.



The speckled coloring of the **Short-eared Owl** enables it to be camouflaged while hunting in open meadows and prairies, and also when nesting on the ground.



The ability of **Swainson's Thrush** to blend in with shrubs and leaf litter comes in handy when it forages for insects near the ground.



The **Hutton's Vireo** coloration matches the bark of oak trees, from which this bird finds insects and spiders to eat.



Great Knots use both camouflage coloring, and flocking in great numbers to increase their individual chances of survival when they migrate.



Male and female **Mallard Ducks** display *dichromatism*, the male is marked with bright coloration and the female is more cryptically colored. The female's ability to camouflage aids in protecting her when she is guarding her nest and offspring.

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