

Investigation Five – Specialized Structures and Environments

Standard V Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.
Objective 2 Describe how some characteristics could give a species a survival advantage in a particular environment.
Intended Learning Outcomes <ol style="list-style-type: none">1. Use science process and thinking skills.2. Manifest scientific attitudes and interests.3. Understand science concepts and principles.4. Communicate effectively using science language and reasoning.

**Standard
V**

Objective
2

Background Information

Variations are differences in appearance of an inherited trait among members of a species. These variations give a **species** (a group of plants or animals that can only reproduce among themselves) a better chance to live, or a **survival advantage**. Other variations may include **specialized structures** or body parts.

Outer coverings of animals have many functions that help each species survive in its particular environment. The following are some functions of outer skin coverings:

- Temperature Control. The fur of some animals keeps a layer of warm air close to the body; sweat glands in the skin also keep the body cool.
- Defense against parasites. Animals with scales and shells have some extra protection against small parasites that try to enter through their skin.
- Defense against poisonous plants. Oils from plants such as poison ivy irritate the skin. The fur of animals keeps the oily irritant away from the skin until the oil breaks down over time.
- Defense against sunburn. Ultraviolet rays from the sun can damage skin. Tropical animals such as monkeys and parrots are protected from sunburn by their hair and feathers.
- Defense against predators. The skin of the puffer fish and the porcupine has sharp spines that repel predators. The backbone of the turtle is a scale-covered shell that provides defensive protection.
- Warning to predators. Poison arrow frogs and monarch butterflies have toxic substances in their bodies that can kill or repel a predator. Their bright warning colors turn predators away before they attack. Skunks have a bold black and white warning pattern because most animals that prey on them only have black and white vision.

- Mimicry. Some organisms have coloring, distinctive patterns or other behaviors which resemble other organisms that may be dangerous, poisonous or unpleasant to eat. Predators avoid these organisms because they think these counterfeits are the real thing. For example, viceroy butterflies that are not toxic to predators mimic the coloration of monarch butterflies that are poisonous. Two or more unpalatable species may also resemble each other, providing increased protection for both against predators.
- Camouflage from predators. The patterns on some insect skins mimic leaves, bark and even bird droppings. Animals like zebras have patterns that help them blend into tall grass.
- Deceiving predators. False heads or large, fake eyes can startle predators momentarily, allowing the prey to escape. They can also lead the predator to strike a non-vital area, such as attaching the animal's tail instead of its head.
- Attraction of a mate. Some birds and butterflies have brightly colored wings to attract potential mates.

Invitation to Learn

1. Have a variety of outerwear displayed. Ask for several student volunteers to assist in the demonstration.
2. Ask the volunteers which of the items they would wear if it were:
 - A bright, crisp fall afternoon?
 - A cold, snowy winter night?
 - During a rain storm
 - A cool summer's evening?
 - Going to the beach?
 - Going hiking?

Materials

- A variety of outerwear, including different types of coats and jackets, sun screen, hats, gloves, sunglasses, boots, sandals. etc.

The students then choose an appropriate combination of outerwear for that situation.

3. Discuss with the class how we wear different outerwear throughout the year depending on how our environment changes.
4. Tell the students that animals have different outer coverings depending on where they live, what they eat, and what eats them. They will be in investigating how the environment and outer skin coverings can work together for an animal's advantage.

Instructional Procedure

Activity A

1. Discuss with students the different functions of outer coverings of animals.
2. Pass around the samples of outer coverings used by animals and/or pictures of animals. Have students respond, in chart form, to the following for each example:
 - Describe the physical traits of the outer covering
 - Describe the coverings possible functions
 - Describe the environment in which the animal who wear it would live.
 - Describe the advantages it would give the animal
 - Describe the limitations it would give the animal.
3. Discuss their responses to each example as a class.

Activity B

1. Distribute a butterfly pattern to each student. (Page 12.2.28)
2. Instruct the students to color their butterfly in such a way that it will blend into an area of the classroom of their choice.
3. Send half of the class out of the room while the other half hides their butterflies, taping them in place.
4. Bring in the students and challenge them to find the butterflies; the winner is the student whose butterfly takes the longest to find.
5. Repeat the activity to allow the other half of the class an opportunity to hide their butterflies.
6. Take the winning butterflies and place them on backgrounds that makes them “stand out”.
7. Pose the following questions to the students:
 - What would happen to these butterflies if their environment suddenly changed and their coloration became an “EAT ME” sign instead of protection?
 - What would eventually happen to this species of butterfly?
 - What possible things could happen to give this species another survival advantage?
8. Arrange for 2-3 adults to come into your classroom for the next part of this activity. *Teaching Tip: The students will enjoy having the principal, vice principal, and other adults with whom they have a relationship.*
9. Explain to students that the adults will become visiting birds and have to find a certain amount of “food” within 1 minute. Have the students hide ALL of their butterflies in the classroom “environment.”
10. Outside the classroom, explain to the adults the purpose of the activity and their “bird roles.” Have the adults come in and proceed with the activity. Have the children reward the “bird” that found the most food.
11. Afterwards have a discussion with the students about how organisms use their special structures for a survival advantage in a particular environment.

Materials

- Samples of different types of outer coverings used by animals, such as rabbit fur, seashells, sheep wool, snakeskin and feathers; or
- Pictures of different animals like fish, dogs, frogs, leopards, tigers, porcupines, etc.

Teaching Tip:

These pictures can also be used for the

Variations for Survival activity.

Materials

- 1 butterfly pattern photo copied on white paper for each student
- Crayons and/or markers
- Tape

Curriculum Extensions

Science –

- Have the students look around their homes and yards for insects that are hiding. Have them write down how they have camouflaged themselves with their environment. Have them draw pictures and give explanations. (ILOs 1, 2, 4)

Assessment Suggestion

- Have students recall specialized structures animals and insects have for survival naming them by name. Example: Pill bugs: protective plates; praying mantis: color; porcupine: quills.
- Have students write how organisms use their special structures for survival advantage.

Reference to Assessment Section:

	Multiple Choice	Constructive Response	Performance Test
Unit Test	3, 4, 6, 7, 8, 9, 10	3, 4	My Favorite Wild Animal

Resources

See page 12.2.25

