

Thorns & Threats

Grade: 1st grade

Duration: 1.5 to 2 hours

Location: Outdoors

Season: Any time of year

Introduction: Tie together your plant and animal studies, as students investigate how both plants and animals protect themselves. Through interactive activities and role playing students will discover the defense strategies of plants and animals. You may be surprised at the similarities!

Investigation Question: How do plants and animals defend themselves from predators? Are there similarities between plants and animals in the ways they defend themselves from predators?

Key Concept: (student takeaway): There are many different ways that plants and animals can protect themselves and some strategies can be used by both animals and plants.

NGSS

Disciplinary Core Ideas:

LS1.A: Structure and Function: All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp object, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

LS1.D: Information processing: Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.

Cross Cutting Concepts:

Patterns: patterns can be observed.

Structure and Function: shape and stability is related to function.

Practices:

Making observations

Modelling

Background information (what does the instructor need to know)

- There is a botanical difference between spines, thorns, and prickles. All are sharp and pointy protrusions, but are classified as modifications of different plant parts. Spines are modified leaves, thorns are modified stems, and prickles are modified epidermis layers.

- Domesticated dogs and young wild animals often fall victim to wild animal defenses (i.e. being sprayed by a skunk or stuck by a porcupine) more than older wild animals simply because they have less experience encountering such things.
- Porcupines are fond of hemlock stand and enjoying chewing on hemlock twig. Hemlock twigs are not high in energy, but the porcupine, having such a strong natural defense doesn't tend to move quickly, thus it doesn't require a high energy diet. Porcupines can climb trees, using their long sharp claws. Porcupine quills have scales on them, which makes the quills difficult to remove. In the wild, if an animal is stuck with porcupine quills, there is a high probability that animal will die.
- Not only toads produce a foul tasting substance when threatened, they also puff up to make themselves bigger and thus much more difficult to swallow.
- Milkweed sap, is not dangerous to the touch but for some can be an irritant. While many predators don't eat milkweed directly, eating a butterfly that has eaten milkweed has the same effect.
- Skunks don't like to spray animals unless they feel extremely threatened. It takes a long time to create the substance and takes a lot of energy. The skunks will give warnings first before resulting to spraying. When spraying the skunk with face the predator not only with its rear but also with it's face to help the animal aim. A skunk has two tubes to spray from and can aim the independently from one another. Skunks like to aim for the eyes.

Materials:

- Defense puzzle cards
- Defense skit cards
- Milkweed Pod
- Porcupine Quills
- Horse-chestnut
- Black Cherry Leaf
- Wasps Nest
- Turtle Shell/Clam Shell
- Rose Stem/Blackberry Stem

Method:

Prep Before Program

1. Scout out a trail path that has different examples of each of the different defenses. There should be places that correspond with each defense strategy skit along the trail. *If program is happening at BEEC see Variations section.* It is possible to have two skits at the one location. If leaving sample materials at each stop, that should be done right before the program

Part 1- can be done inside or outside

1) **Welcome** - Today is all about the defenses of plants and animals... What is a defense? What are they defending against? ...

2) **Defense Puzzles:** Each student receives one puzzle piece card with a picture of a plant or animal that has a defense that will be discussed during the program. The opposing side will identify the picture and give a short phrase describing the defense. After looking at the card, the students should be instructed to find two other students who complete their puzzle. Each set of cards are color coordinated if students are needing help finding their group. Once each group has found each other, have the student's look and compare their plants and animals and identify what / which defense their cards have in common. Then have each group share their cards and their defense with the whole class.

- Prickly:
 - Porcupine- loose, barbed quills stick to enemy;
 - Cactus- spines repel enemies;
 - Beechnut- nut covered with sharp bristles until completely ripe
- Smells Bad:
 - Skunk- when cornered, squirts bad smelling substance;
 - Black Cherry Tree- twigs and leaves contain bad-smelling chemicals
 - Stink Bug- when disturbed, releases a bad smelling chemical
- Stings:
 - Yellow Jacket- sharp stinger attached to poison sac;
 - Nettles- sharp, brittle hairs, inject irritating chemical when broken off
 - Bee- sharp stinger attached to poison sac
- Hard Shell:
 - Clam or mussel- closes hard shell when disturbed;
 - Turtle- retreats into hard shell when disturbed;
 - Butternut- nut is encased in hard shell and inedible husk
 - Black Walnut- nut is encased in a hard shell and inedible husk
- Thorns/Looks Scary:
 - Blackberry- sharp, hooked thorns discourage enemies from eating plants;
 - Owl- when threatened, inflates to several times its normal size;
 - Hawthorn: sharp thorns on branches discourage enemies from eating plants
 - Underwing Moth: camouflaged until it flies, then flashes large eye spots on underwings
- Tastes Bad or Poisonous:

- Toad-when eaten, tastes bad and causes predator to get sick;
- Milkweed- the leaves contain poison and a bad-tasting sticky sap
- Shrews- have glands along their bellies that causes the predator to spit them out

3) Observations - If time is short for the program it could save time to do this now as a group, rather than look at the examples at each stop/skit along the trail. As a group pass around samples of several of these defenses and with person next to you discover what they are. At end if any are still in question - share with the group. Milkweed Pod, Porcupine Quills, Black Cherry Leaf, Wasps Nest, Turtle Shell/Clam Shell, Rose Stem/Blackberry Stem, Horse-chestnut

4) Sharp Eyes: - Let's get into the detecting mood. Everybody get into pairs and stand facing each other. I am going to give you 1-min to carefully study your partner's appearance. *asking probing questions here*. After than 1-min is over, turn around so you and your partner are back to back and you can't see one another. Now, each person, I want you to change three things about yourself. *give examples*. I will give you two mins, to do this. Once, you are done, you can turn around and face each other again. Taking turns, try and figure out what your partner has changed.

Part 2 - outside, in part field and forest if possible

5) Exploration & Defense Strategy Skits: Take the students on a walk outdoors along a trail that contains examples of each defense. When entering an area where examples of the defense could be found, invite the students to explore and see what they can find. At predetermined locations (preferably in places that match nicely with a defense strategy), pause the group. If at BEEC the loop could be: sumac circe - thorns, a-frame - prickly, mossy rocks - hard shell - grandmother maple - stings, upper ridge - smells bad, hilltop - tastes bad.

At these points:

- Explain to the group
- Invite corresponding defense group to perform their skit for the other students. And have an adult narrate the script of the story, pausing between lines to give the students time to act out the words. See skit descriptions below.
- Show a sample of the defense strategy (milkweed pod, quills, black cherry leaf, nest, thorny stem, shell). This can be placed out ahead of time or carried with the instructor.
- Give each student an opportunity to look at the sample, by either passing it around or holding it for each student.

Defense Strategy SKITS:

Thorns/Look Scary:

Roles: Fox, Rabbit, bramble, owl,

A fox is on the hunt for a tasty night time meal. Creeping slowly through the forest, it spots a rabbit. The fox chases after the rabbit, but the rabbit is smart and runs underneath the stems of a blackberry bramble patch. The fox stops. Not wanting to go through the thorns, the fox decides to go around the bramble patch. Going along the edge of the thorn, the fox spooks an owl who was hunting the same rabbit. The owl, sensing the fox's threat, puffs up his feathers to make it seem much larger than its actual size. The fox, frightened by this much larger animal, runs away to find dinner elsewhere.

Prickly:

Roles: Porcupine and 2 Coyotes

Here sits a porcupine minding its own business, chewing on a stick out in the forest. When suddenly two young and foolish coyotes approach. Not knowing any better, the two coyotes think the porcupine would make a delicious meal. Threatened, the porcupine puffs up its quills and turns so his tail faces the coyotes. The porcupine's tail is strong and unlike his unprotected face, is covered with protective quills. The three animals move in a circle, the coyotes trying to reach the porcupine's face and the porcupine moving to keep his quill-covered tail pointed towards the coyotes. With each turn of the circle the coyote moves closer and closer to the porcupine. *PHING!* A coyote gets too close and some quills become stuck in her face. The coyote yelps and runs off into the woods. The other coyote, seeing the porcupine is not an animal to mess with, follows into the woods. The porcupine settles back down his quills and continues chewing on his stick.

- Have everybody do their best prickly cactus pose.

Hard Shell:

Roles: Turtle, Opossum, Turkey, Walnut

A box turtle, moving slowly along the ground, is approached by an opossum. Startled and wanting to defend itself, the turtle pulls in legs and head into its shell. Unlike other turtles, the box turtle can completely pull itself into the shell, leaving nothing out in the open. The opossum still interested in the turtle, bats at the shell knocking it around a bit. After sometime, the opossum gives up and moves on. The box turtle comes out of its shell and continues on its way. Elsewhere in the forest, a turkey looking for something to eat finds a walnut. *Peck, Peck, Peck*, the turkey tries to crack open the walnut husk, but it is too hard. The turkey decides to find a different snack. The walnut is safe for now.

Stings:

Roles: Gardener, stinging nettle, raccoon, wasp

One day out in the garden, *name of student* is helping pull weeds. Handful, after handful, *name of student* reaches down, pulls the weeds out of the ground and places them in a bucket. Reaching down for the next handful, *name of student* grabs a stinging nettle! *OUCH!* *name of student* hollers in pain. The stinging nettle is covered in hundreds of tiny sharp hollow hairs it uses to sting anything that might try to eat it or pull it. Nearby a very young and curious raccoon is exploring the forest for something to eat, when it finds a wasps nest. Interested in the paper like texture, the raccoon uses its sensitive paws to swipe at the wasps nest. The wasps, knowing their home is under attack, fly into action. Leaving the nest, they swarm the raccoon and begin to sting it. But unlike a bee, whose stinger is left behind, the wasps can sting multiple times, chasing the racoon away until the nest is safe once again.

Smells Bad:

Roles: Dog, 2 Skunks

Minding its own business, there is a pair of skunks walking through the forest, when a dog approaches. The skunks feel threatens, but not liking to spray, unless absolutely necessary, the skunk first stamps its feet. Not frightened, the dog barks and moves closer. The skunk gives another warning and stands up on its two **front** feet and shows the dog his stripes, warning it to not come any closer. Still not frightened, the dog barks and moves closer. The skunk now feeling that is it absolutely necessary, turn its behind towards the dog and turning its head to aim, *psssst*. It sprays the dog with a bad smelling substance. This forces the dog to run away. The skunk needing time to recover, moves off to find a safer place to be.

Tastes Bad or Poisonous:

Role: Butterfly, Dog, Toad

First we have a butterfly, enjoying the spring day and eating some milkweed. Over here, we have a young, very foolish, dog that stumbles across a toad. Unsure what the toad is the dog opens its mouth and tries to eat. The toad, not wanting to be eaten of course, produces a yucky tasting chemical from the sides of his belly. The dog spits out the toad and continues on. The toad hops away. Soon after, the dog comes across a the butterfly. The dog, not knowing that butterflies that feast on milkweed taste just as bad as the toad, tries to catch it with it's mouth. The dog succeeds and eats the butterfly. Soon after the dog becomes sick from the butterfly. The foolish dog now knows not to mess with toads or butterflies.

6) Porcupine and Weasel Game: *This game is great to do right after the porcupine skit.*

Explain the weasels are porcupine experts. They chase porcupine off the edge of limbs in hopes

that the porcupine will land on its back and expose its softer belly. The weasel will then run down the tree face first. Think about a cat and how it climbs down a tree, backwards. A weasel can turn this wrist around *have the kids mimic this* so it can move much more quickly down the tree. Once down the tree it pounces on the porcupine's belly. So in the game, get into pairs, one person will be a porcupine, the other a weasel. *They will switch roles*. The goal of the weasel is to *gently* tag the porcupine's belly and to not get stuck by quills (touch the porcupine person's back). The porcupine's job is to keep its back facing towards the weasel and not get their belly tagged. ***Give a reminder*** that porcupines are slow, waddling animals. They are not fast runners, they rely on their quills to protect them. That means that while playing this game, the porcupine should not be running around. The game should take place in the same place they are standing.

7) Closing Piece: If I could be ____ I would be because _____. Ask the students this question, give them time to think about it. Give examples. I would be a porcupine so I could have quills that could keep predators away, or I would be a oak tree so I could be really tall and see for miles. Then take turns and share out with the group. If there is a time constraint, break into two smaller groups.

Extensions / Variations (numbered bullets)

1. If at BEEC:
 - a. Lower Field - thorns
 - b. In the hemlock forest , this is where porcupines like to live (and we could put out some porcupine quills at the base of the tree hollow)... and we are going to do a skit involving a porcupine ...
 - c. Courtyard- Nettles for sting in summer OR wasp nest somewhere else
 - d. Grandmother Maple/A-Frame/Entrance to Deer Run- can find hard butternut / hickory nut shells
 - e. Ridge North of Grandmother Maple- Smells with Black Cherry (maybe stage for a skunk)
 - f. Hilltop- Milkweed
2. Defense Strategy Skits - If time allows. groups could be given time to practice and create their skit, instead of acted out impromptu as narrated. Using the same groups as the defense puzzles, each group gets a defense strategy skit cards (same color codes as the puzzles) that details an event showcasing how their defense protects the animal/plant. The groups should be instructed to create a *simple* skit that can be acted out whilst the card is being read. Also inform the students that they will be called upon to perform their

skirts along the trail, so it needs to be something that they can remember. Give the students time to create and practice their skirts (min. 1 adult per group, groups can be condensed if needed) before heading off on the trail walk. In those teams, create a skirt using the story handed to them.

3. Other Potential Puzzles:

- **Slimy and Slippery:**
 - **Slug- slimy coating repels enemies;**
 - **Eel- slippery coating aids escape;**
 - **Earthworm- slippery coating aids escape**
- **Sounds Scary:**
 - **Rattlesnake-before striking, rattles tail;**
 - **Cat- hisses when frightened**

4. When possible bring in information regarding to the other two programs

- Beechnut- is what part of the plant?
- Thorns can be found on what part of the plant?
- When we were looking at milkweed pods and shells before, what animal were we pretending to be? Raccoons have that amazing sense of touch.
- Owls have big eyes to see at dark?

Vocabulary

- **Defense:** Something that gives a plant or animal protection, such as porcupine quills or rose thorns.
- **Strategy:** A plan of action to reach a certain result
- **Spines:** sharp part of the plant that is a modified leaf
- **Thorns:** sharp part of the plant that is a modified stem
- **Prickles:** sharp part of the plant that is modified epidermis
- **Threat:** intention to inflict pain, injury, damage, or other hostile action
- **Gland:** An organ that produces a chemical

Pre / Post Visit Activities (for teachers if applicable)

Resources to pull from:

Chapter “Thorns and Threats” in *Hands on Nature* by Lingelbach and Purcell, VINS

Nearby Nature: <http://nearbynature.fwni.org/unit/structure-and-function/daunting-defenses/>