

Plant Adaptations: Carnivorous Plants

Overview: To expand students' understanding of the interdependence of organisms by studying carnivorous plants and creating their own new species.

Grade Level/Range: 1st- 8th Grade

Objective:

Students will learn about:

- the adaptations of carnivorous plants by creating their own model plant
- the characteristics of wetland habitats and their importance in our environment

Time: 1 to 2 hours

Materials:

- Internet access or book with pictures of carnivorous plants
- Assorted craft materials such as construction paper, markers, pipe cleaners, fuzzy balls, paper clips, etc.

Background Information

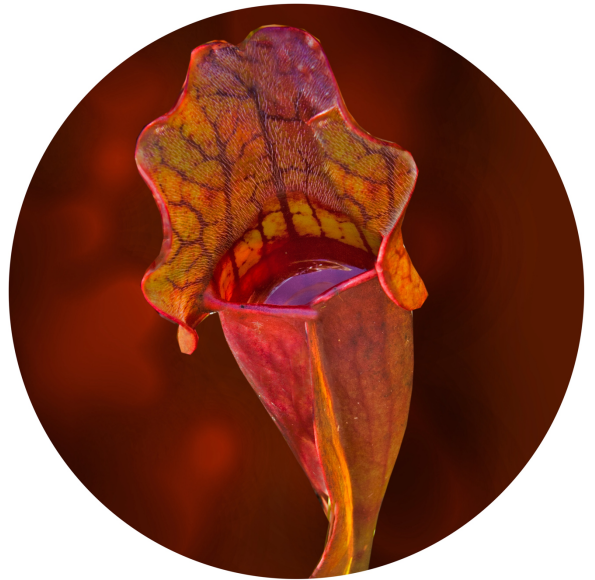
Carnivorous plants are a prime example of living organisms adapting to survive in their environment. A special ability to capture and decompose animal life forms and then absorb the nutrients they release allows these plants to thrive where other plants struggle. They are found growing in boggy wetlands where soil nutrient levels are extremely low because of acidic conditions, high water content, and low oxygen levels, which all lead to very slow decomposition of organic matter. Their unique way of obtaining necessary nutrients provides them with an advantage in this challenging environment.

The most common prey of carnivorous plants are small insects including gnats, flies, bees, moths, beetles and ants, however animals as large as frogs and small rodents have been found in their traps (though very rare).

Carnivorous plants use a number of tricks to lure insects to their traps with the most common being color, scent, and nectar. The insects arrive with the promise of a tasty meal and soon realize they are the ones on the menu.

Luring Their Prey

Here are some examples of strategies carnivorous plants use to lure insects to their traps.



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Color. Some use pigmentation patterns, which may only be visible to their prey's ultraviolet vision. There may be guide hairs to direct the insect to the trap.

Scent. Some give off odors attractive to their prey, such as a honey scent or fungal odor.

Nectar. Usually found in flowers to lure insects to help with pollination, nectar produced by carnivorous plants allows prey one last sweet treat before it becomes entrapped.

Trapping Their Prey

Once the carnivorous plant has seduced its prey to come into contact, the next step is capturing it, and this is where some of the most interesting and incredible adaptations are found. Common trapping techniques are pitfall traps, flypaper traps, snapping traps, and suction traps. The first two use adaptations that involve shape and sticky surfaces. The last two are particularly fascinating, because the presence of prey triggers the plant to take action — to move, quickly! — to ensnare the hapless creature. Here are more details about how these traps work:

Pitfall Traps. Plants have tube-shaped leaves which serve as pits of doom for insects. Once they enter, they cannot fly or crawl back out. Pitfall traps usually have slippery sides that are covered with downward facing hairs or growths. At the bottom of the tube the insect drowns. Examples include pitcher plants.

Flypaper Traps. Plants have sticky or gooey surfaces that keep insects from leaving. Examples include sundews and butterworts.

Snapping Traps. Plants have leaves that enclose prey when a trigger is activated. Examples include the Venus flytrap and waterwheel plant.

Suction Traps. Plants have a trap door mechanism that springs open when triggered and sucks the insect into sac-shaped parts then closes behind them. Example is a bladderwort.

Laying the Groundwork

Introduce carnivorous plants to your students. Explain that carnivorous plants are plants that are specially adapted to live in bogs, a type of wetland where soil nutrient levels are extremely low because of acidic conditions, high water content, and low oxygen levels. Since proper nutrients are not available in the soil, instead they have evolved ways to capture and decompose animal life forms (usually small insects like small insects including gnats, flies, bees, moths, beetles and ants) and then absorb the nutrients that are released.

Watch a video showing the [dissection of a pitcher plant](#) from the Exploratorium's Science of Gardening Series.

Ask students, how are carnivorous plants different than other plants? How are they the same? What is an adaptation? What are the benefits of the adaptations of carnivorous plants?

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Exploration

1. Share information about some of the common characteristics of and mechanisms used by carnivorous plants to lure and trap prey as listed in the Background Information above. Share some examples from live sample plants or if none are available to you, from books, catalogs or online resources.
2. Ask students to create their own carnivorous plant. They can create a simple design on paper, or use craft and recycled materials to create a 3-D model of their plant. Prompt them to first decide what prey their plant will attract (it can be a real organism such as an insect or they can make up a new animal) and then answer the following questions:
 - How does your plant attract its prey?
 - How does your plant trap its prey?
 - What happens after it is trapped?
 - What is the name of your plant?
 - Describe the habitat of your plant.
3. Ask students to share their new creations. If possible, put them on display for others to see.

Making Connections

Carnivorous plants are in danger of becoming extinct for a number of reasons. Share the following threats to carnivorous plant habitats with your students:

Their habitat is shrinking due to land development for housing and farming. Since they are not easily transplanted into new environments, when their natural habitat is gone, their wild populations will also disappear. Carnivorous plants have the advantage in poor soils, but in areas with normal soil conditions, non-carnivorous plants (both native and invasive species) will out-compete carnivorous for space and resources.

Over-collection of wild populations. Even though carnivorous plants are hard to grow and rarely survive for any but the most experienced gardener, some individual and professional growers obtain their stock from the wild in spite of laws and regulations limiting and in some cases prohibiting collection.

Pollution of habitats. In addition to the shrinking size of their habitats, pollution of the land and water by pesticides and fertilizers is further reducing carnivorous plant populations.

Ask students the following questions:

- What is a habitat? Name some different habitats you have visited.
- What is a wetland habitat? What are some of the plant and animal species that live there?
- Why do you think wetlands are important? Check out the [EPA's Wetlands Website](#) for ideas.
- What can we do about some of the environmental threats facing wetlands and their inhabitants like carnivorous plants?

Branching Out:

- Younger students may enjoy reading *Plantzilla* by Jerdine Nolen. *Plantzilla* is a book about a special plant that becomes part of the family. Students can follow up by writing a story about the plant they created for this lesson.

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- Older students may want to learn more about the issues and challenges facing wetland habitats by researching current events then sharing their findings in writing or through discussion or debate. Here are two online sources for listings of recent news:
 - [Wetland Breaking News](#)
 - Archived [wetland news](#) from the New York Times.

Link to Standards:

This lesson could be used to teach the following Next Generation Science Standards Performance Expectations:

1-LS1 From Molecules to Organisms: Structures and Processes

1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

2-LS4 Biological Evolution: Unity and Diversity

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

3-LS3 Heredity: Inheritance and Variation of Traits

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4 Biological Evolution: Unity and Diversity

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

4-LS1 From Molecules to Organisms: Structures and Processes

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

MS-LS1 From Molecules to Organisms: Structures and Processes

MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

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