Pollinator Teaching Guide with Accompanying Activities for Grades 3-8

Created by members of the Central U.P. Chapter of Wild Ones

Photo by James Ridgway

This guide was made from a presentation developed by Valerie Heemstra on pollinators. It is meant to be a resource aid for both teachers and parents. It provides an outline with video links and ready-made activities to help teach students about the amazing topic of pollination. Accompanying activities are included by permission from MSU Extension, Tollgate Farm and Education Center, Monarch Joint Venture and USDA Forest Service. Original games developed by Janet Ekstrum.

Part 1- Introduction to Pollination

Question: What is one simple way that animals differ from plants?

Answer: Animals can move from place to place, and most plants (at least, those that produce seeds) stay put in one place.

Question: Why do you think that movement is important in pollination?

Answer: If plants can't move and they need to have the pollen from one plant reach the ovary of another plant in order to make seeds, something that can move the pollen becomes important. These are the pollinators.

Question: Then What is Pollination?

Answer: The act of getting the pollen, which contains the male cell, to the female cell to make a seed to grow a new plant. Pollen from one plant is moved by wind or insects called pollinators. See Part 2 for more information.

Question: What pollinators can you think of other than bees?

Answer: Wind, Insects, Bats and Birds

Question: In the U.S. what do many of our fruits and vegetables depend on for pollination?

Answer: Insects and Wind

Question: Which kinds of plants depend on wind?

Answer: Grasses such as wheat, from which we get flour to make bread and cookies and other baked goods.

Question: What do you think is an important pollinator of apples, almonds, strawberries and avocados?

Answer: Bees

Video Accompaniment for Part 1- Introduction to Pollination

Video Name and Creator Credit	URL Location
MSU Tollgate Farm Pollinator Project Part 1: What is a Pollinator Credit: Michigan State University, Tollgate Farm and Education Center	https://www.youtube.com/watch?v=7keNP8phKLQ
Why is Pollination Important Credit: USDA Forest Service	https://www.fs.usda.gov/managing-land/wildflowers/pollinators/importance
Who Are the Pollinators – Bats Credit: USDA Forest Service	https://www.fs.usda.gov/managing-land/wildflowers/pollinators/who-are-the-pollinators/bats
Who Are the Pollinators – Birds Credit: USDA Forest Service	https://www.fs.usda.gov/wildflowers/pollinators/animals/birds.shtml
Who Are the Pollinators – Bees Credit: USDA Forest Service	https://www.fs.usda.gov/wildflowers/pollinators/animals/bees.shtml
Who Are the Pollinators – Wind Credit: USDA Forest Service	https://www.fs.usda.gov/wildflowers/pollinators/wind.shtml
Pollinator of the Month Page on USDA Forest Service Celebrating Wildflowers Website: bats, bees, beetles, birds, butterflies, flies, moths, mosquitoes and wasps. Credit: USDA Forest Service	https://www.fs.usda.gov/wildflowers/pollinators/pollinator-of-the-month/index.shtml
Honeybees vs. Native Bees Credit: Wild Ones, North Oakland Chapter	https://northoakland.wildones.org/honey-bees-vs-native-bees-help-the-right-bees/

Part 2 - Pollen, Nectar and Honey

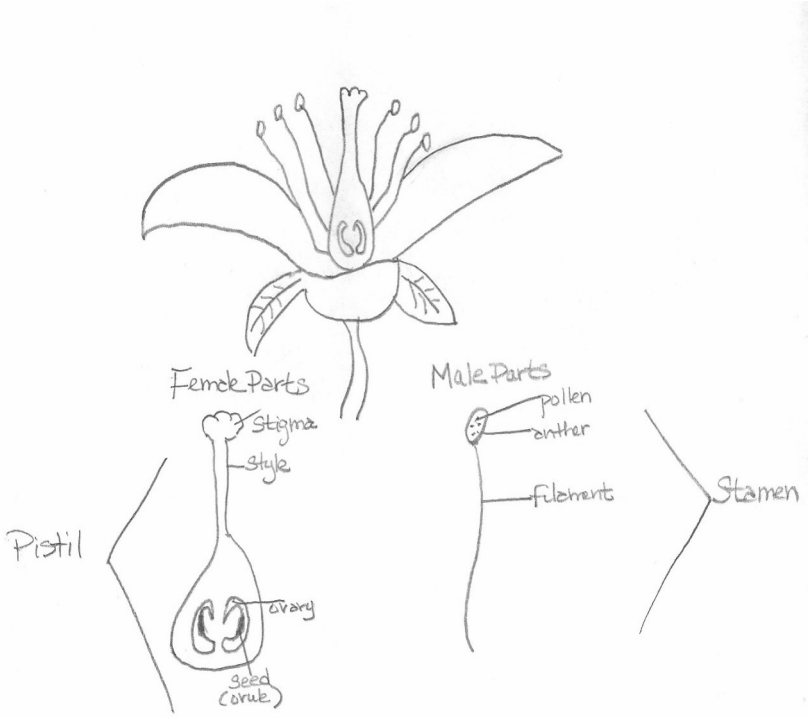
Let's take a moment to talk about what pollen is. Pollen contains the male cell.

<u>Activity</u>: Various images of pollen are available by searching the internet. Look up photos of pollen from oak tree, conifers, dandelion, and rose pollen for the following conversation.

Do you notice that pollen doesn't look like the plant it comes from? It is very small, and the photos are enlarged by microscopes and the computer. Some very small pollen is released by evergreen (conifer) trees and it looks like smoke or dust when it is released. Wind pollination is usually of very small pollen.

In order to make a seed, pollen needs to get to the female cell, an egg, which is inside the ovary of another flower. That's the job of the pollinator.

Parts of a Flower:



Parts of a Flower:

Stamen (Male)
The stamen is the male reproductive part of a flower. It is made up of the anther and filament. Pollen is produced on the anther.

Pistil (Female)
The female reproductive part of plant is called the pistil, also known as the carpel. It is made up of the stigma, style and ovary. The top of the stigma catches pollen.

Did you know that bumblebees are especially good at pollinating tomatoes?

Question: What are the parts of the bee that are involved in pollination?

> Answer: Hairs on the legs and bodies of bees pick up some pollens by a force similar to static electricity, and bumblebees actually have little pockets in the legs that accumulate pollen.

Question: What are the parts of the bee that are involved in pollination?

> Answer: Hairs on the legs and bodies of bees pick up pollen by static electricity. Then the bees groom themselves by wiping their legs and body hairs and that's the pollen that they put in the pollen baskets on their hind legs using bristles on their legs to transfer it. The pollen baskets make it easy to carry pollen back to their hive. Just females have pollen baskets.

We call the pollen that bees collect bee bread and they feed it to their babies back in the hive.

But the bees didn't go to the flower in order to collect just pollen.

Question: What else do bees gather from flowers that they really want?

> Answer: Nectar. The bee laps like a cat or sucks up nectar with its mouth, depending on the kind of flower. A bee mouth has many parts adapted at pollinating tomatoes.

Question: And what do they do with the nectar?

> Answer: They make it into honey.

Pollination by bees is so important that people get paid to bring trays of bees to orchards to pollinate some of our crops in California.

Question: Why do you think there are not enough bees flying around in the wild to do this?

> Answer: Crop spraying has killed many insects. People spray and spread insecticides in and around their homes, and often on lawns. In gardens they may spray to kill some insects, but when they do, they kill good insects, too. Additionally bug zappers used to manage mosquitoes also kill many insects.

What about butterflies? They visit flowers.

Question: Do butterflies pollinate some flowers?

> Answer: Yes, they do. They come to the flowers for the same reason that bees do, to gather nectar. They have very different mouths from the bees. They have a proboscis.

Question: Have you heard of any other animal that has a proboscis?

> Answer: Elephants!

Question: Now why do you think a butterfly has something like a trunk on the front of its head?

> Answer: In order to reach the nectar that is way down in the center of a flower. They use their proboscis like a drinking straw and get the nectar that way.

Question: But do you think they can fly around with their proboscis sticking straight out in front of them?

> Answer: No! It would get in their way.

Question: So what do you think they do with their proboscis when it isn't sticking down into a flower?

> Answer: They roll it up! When they get to a flower, they unroll it straight down into the nectar!

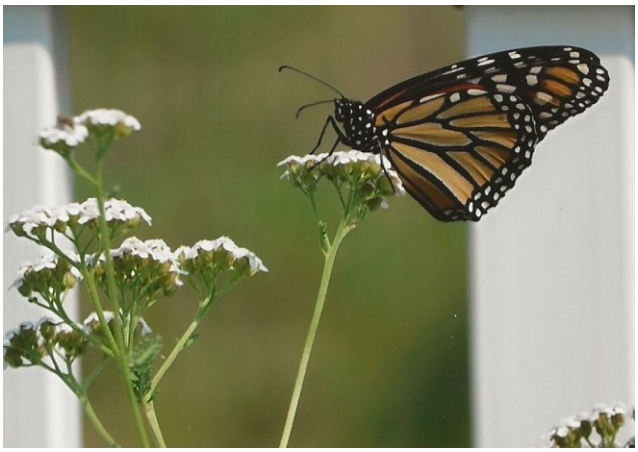


Photo: Valerie Heenstra

Butterflies have beautiful wings and some of their close relatives, the moths, also have beautiful wings. The color on the wings is from the scales that cover the wings. The butterflies and moths belong to the insect group known as Lepidoptera, which means scaly wing.

Question: Can you tell the difference between a butterfly and a moth by looking at the antennae?

> Answer: Yes, butterflies usually have a little knob at the end of the antennae. The antennae are at the front end of the head. The part behind the head is called the thorax, and that is where the legs are attached.

Question: How many legs does a butterfly or a bee have?

> Answer: Six. All insects have six legs. Spiders have eight legs.

And the last part of the butterfly is behind the thorax and is called the abdomen. Head, thorax, abdomen. Besides the antennae, the proboscis is on the head, of course.

Photo: Valerie Heemstra

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Video Accompaniment for Part 2- Pollen, Nectar and Honey

Video Name and Creator Credit	URL Location
MSU Tollgate Farm Pollinator Project Part 2: How Do Flowers Attract Pollinators Credit: Michigan State University Extension, Tollgate Farm and Education Center	https://www.youtube.com/watch?v=Nn7UZcWiEVA
MSU Tollgate Farm Pollinator Project Part 3: How Can We Help Pollinators Credit: Michigan State University Extension, Tollgate Farm and Education Center	https://www.youtube.com/watch?v=fuCBnlQmulg
Who Are the Pollinators – Insect Basics Credit: USDA Forest Service	https://www.fs.usda.gov/wildflowers/pollinators/animals/insectbasics.shtml
Globe Mallow Bee foraging and collecting pollen	https://www.fs.usda.gov/wildflowers/pollinators/pollinator-of-the-month/globe_mallow_bee.shtml

Part 3 - How to Encourage and Help Pollinators

There are ways you can help pollinators — do you know some of these?
Turn outdoor lights off at night.

Question: Why do you think it's important to turn outdoor lights off at night?

> Answer: Moths pollinate flowers, but moths are attracted to light at night and will keep flying around it until they die (have you seen dead moths under lights?)

Another way you can help pollinators is to have many different kinds of flowers and other plants in your yard to serve the needs of many different insects.

Activity: See Appendix 1 for Honey Bee Survival Game

Question: Did you know that Monarch butterflies need milkweed when they are young?

> Answer: The milkweed has a sap that is poisonous to most animals, but it isn't poisonous to Monarch caterpillars. When they eat the leaves, some of the poison goes into their bodies, but it doesn't kill them or make them sick. Then, when the caterpillar undergoes metamorphosis and becomes a butterfly, the adult Monarch butterfly has some of the poison in its body, and that is why Monarch butterflies don't get eaten by birds and other animals: if a bird starts to eat a Monarch butterfly, it says "Yuck," and it doesn't eat another one. So milkweed is a good plant for Monarchs.

But we need other plants in the garden, too, to raise other insects and to feed them. Having lots of different flowers and other plants in your garden is a very good idea, and it looks pretty, too. If you don't have a yard, you can plant in containers. Some towns have community gardens where people can plant seeds and grow vegetables and fruits.

Question: Did you know that a chemically treated lawn grass doesn't feed any pollinators?

> **Answer**: Replacing lawns with gardens and shrubs and trees not only looks nice and supports pollinators, but it can save money and time. You won't have to cut the grass, you don't need to fertilize it to keep it green, you won't need any weed killers to make it a green carpet. Many scientists call lawns green deserts because not much can live in or on them.

Activity: See Appendix 2 for Count Those Critters - Lawn vs Garden- Insect Diversity Game

Video Accompaniment for Part 3 – How To Encourage and Help Pollinators

Video Name and Creator Credit	URL Location
What is a Pollinator Lawn Credit: Wild One's National	https://wildones.org/what-is-a-pollinator-lawn/
Monarch Butterfly Life Cycle Credit: Monarch Joint Venture	https://monarchjointventure.org/monarch-biology/life-cycle
Importance of milkweed to monarchs, protective chemistry. What is protective coloration and what other butterflies mimic monarchs Credit: USDA Forest Service	https://www.fs.usda.gov/wildflowers/pollinators/Monarch_Butterfly/habitat/index.shtml
Monarch Butterfly Pollinator of the Month Credit: USDA Forest Service	https://www.fs.usda.gov/wildflowers/pollinators/pollinator-of-the-month/monarch_butterfly.shtml

Quiz Corner – Fun Bug Questions

Here are some questions you can quiz your family and friends with:

Question: What is four letters long and supports less life than a desert?
(Ans: a lawn)

Question: How many mosquitoes will an average dragonfly eat in one day?
(Ans: 30-100. Dragonflies are our friends.)

Question: Why are female bees scarier than male bees?
(Ans: Because female bees can sting, but male bees can’t sting.)