

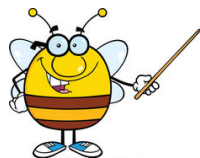
Cloverbud Investigators: Taking the Adventure Outside

Get the Buzz on Pollination

Objectives: Investigators learn what a pollinator is, why it is important and how to create a pollinator habitat in their own back yard.



Background: Gardening connects us to nature and allows us to better understand how things work. In this lesson we are going to look at pollinators. What are they? What do they do? How can we attract them to our homes and gardens? At this point you might be thinking, “Why would I want to attract pollinators?” Over 80% of flowering plants depend on cross pollination to reproduce. One third of the food that we eat comes from plants that rely on pollinators. You can probably guess that without pollinators we would not have things like apples and oranges, but we also would not have chocolate, coffee, nuts, beans, and most of the vegetables we eat. Attracting and protecting pollinators is extremely important. Over the last ten years many pollinator species have declined in numbers; habitat loss, pesticide poisoning, diseases, and pollution have greatly reduced the population size of many species of bees and butterflies. Growing even a small garden for pollinators can make a huge difference, especially if we use native plants and locate them in places where habitat has been lost.



Let's Save the Pollinators!

First, we need some knowledge about pollinators. *What is Pollination?*

Pollination is the process of moving pollen from one flower to another,



which results in fertile seeds. There are many ways pollination can take place including the wind carrying the pollen to another flower or rain splashing the pollen onto another flower. Some flowers can even self-pollinate, but most flowers depend on something called a *pollinator*.



A pollinator can be an insect like a bee, butterfly, moth, or even a beetle, but it can also be an animal, like a bird or bat. Scientists considered pollinators *keystone species* because other species rely on them for survival. If the pollinators die off, so do many of the plants, and then the animals that depend on the plants! Pollinators are also critical for cross pollination between plants.

Cross pollination is beneficial to plants, as it creates genetic diversity and helps them survive and adapt to climate and habit changes. Because plants rely on pollinators, they have evolved many ways to attract them.

1. Some plants provide *nectar* which is a food source to many pollinators like hummingbirds.
2. Pollen contains protein which feeds the larvae of pollinators like bees.
3. Some plants have sweet or strong pungent smells to attract pollinators.



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4. Some plants use petals that have distinct shapes and colors that attract certain pollinators.

Below is a list of colors that attract different pollinators

Bats - dull white, green or purple colors

Bees - bright white, yellow, blue and UV colors which bees can see

Beetles - dull white, or green

Birds - scarlet, orange, red or white

Butterflies - bright colors, including red and purple

Flies - pale to dark brown or purple

Moths - pale, dull red, purple, pink and white



Month's Mystery: Can you catch the Pollinator bug?

Gardeners often talk about catching the gardening “bug”. They really did not catch a bug, what they mean is they started gardening and now they love it and cannot stop! With this activity we hope you catch the pollinator bug! Learning to love pollinators and helping to protect them!



Activity 1. Pollinator Bug Hunt (Taking the adventure outside)

This lesson pairs well with the Cloverbud Career Detectives May lesson entitled “Plant Dissection.” Knowing how flowers work helps to understand the importance of pollinators.

Do ahead: It is important to make sure you do not have children highly allergic to stinging insects. Find a location that has lots of pollinators. This could be a flower garden, field of wildflowers, a local park or a woodlot.

Download an app on your smart phone to ID insects. Or purchase an insect field guide.

Procedure: In groups of 2 or 3, have students spread out in their “research area” and search for insects that look to be visiting the flowers. Have them record, draw and/or collect a sample of the different kinds of insects they find. Caution should be used when collecting or studying bees.

Step 1. Decide on a collection and/or recording method.

Types of recording methods could include taking pictures on cell phones or iPad, drawing the insect, or using an insect guide to key out the insect and recording a list (this method is best with older helpers).

If collecting insects Investigators should practice how to catch, handle, and release insects without harming them. To prevent being stung, Investigators should be able to identify stinging insects and avoid collecting them. (see the BEE-Careful bug handout).

Collection methods:

Insect nets – Nets are great for butterflies, moths, flies, grasshoppers, beetles, etc. however, insects that could sting should be avoided. Care should be taken to not harm the insect with the net. It is easy to smash or damage the wings on insects like butterflies. Demonstrate proper use of the net for the Investigators.

Insect jars -Using a clear plastic or glass jar with a lid is another great method for catching insects. Investigators should practice placing the open end of the jar in front of or above an insect and using the lid behind or under the insect to get it to fly into the jar. Once in the jar, the lid can be tightened, and the insect can be viewed safely and without harm.

Supplies:

- Insect nets - option
- Clear Glass or plastic jars with lids - option
- Cell phone, iPad, or camera – option
- Sketch pad – option
- Insect Identification app or insect field guide
- BEE-Careful bug handout
- Note pad and pencil to record findings
- Data collection sheet
- Hand lens to look for pollen
- Pencil



As the Investigator collects an insect, they should identify it using the app or field guides, record their insect and its location found on the data collection sheet and then carefully release it back where they found it. They need only to collect one of each species for identification but could make notes of how many they see and where most were found. *For example, 10 honeybees found on white clover*

Allow enough time for the investigators to investigate their area. Remind them that some insects are very small, and others are very good at hiding or blending in. They should look carefully and not overlook the small insects like ants.

Once each team has a list, join as a group and share pictures, lists, or other results.

Discussion: Where were the most insects found? Did one type of insect seem to like a certain plant or color flower? Did you see any insects flying from flower to flower? Did you see any insects with pollen attached to them? Did you notice any properties of the plants that attracted the insects to them? (smell, color, nectar) How many different pollinators did the group find? Did you see any pollinators that were NOT insects?



Ask: After watching the pollinators, is there something around our house that we could do to help them? Can we improve their habitat, so it is easier for them to find food, water, and shelter?

Can we plant a food source they like? Can we allow flowers in our lawn? Can we make shelter for them? What about a water source?

Activity 2: Creating a Pollinator Garden

Introduction: Pollinators come in all shapes and sizes. In the first activity Investigators discovered insect pollinators found in their neighborhoods. For this second activity they can use their data collection sheets to start learning about creating habitats for many of the pollinators that might visit their yard. There are thousands of websites, books and resources about creating butterfly gardens, pollinator gardens, hummingbird gardens and gardening for all types of wildlife. With this lesson, we will focus on creating the components of habitat. How we can offer food, water, and shelter in the space we have available?

Begin with a discussion of what we all need to survive: food, water, shelter and space. Food and Water are easy concepts for children to understand, Shelter can be explained as a place to stay warm, safe, and dry. For example, our home provides us shelter. Space is a little harder concept. The idea is that for a habitat to be useable it needs to have food, water, and shelter located in an area that the animal can get too easily, sustains the animal throughout its life cycle, and is relatively safe and clean. All plants and animals need space in their habitats. Large animals like a bear might need miles of habitat but a small animal like a snail may only need a few square feet of living space.

Optional activities to that demonstrate the need for habitat- Project Wild's Habitat Lap Sit or Oh Deer (you can change the Deer in the game to a native pollinator).
<https://www.fishwildlife.org/projectwild>

Take the Adventure Outside - Even in the city we can find elements of habitats. Look around outside; are there any trees? Trees can provide food, shelter and in some cases, water. Grassy or weedy areas are great at providing habitats for small animals. Take a short walk around your neighborhood and have the Investigators point out sources of food, water, and shelter. Keep a running list of pollinators that they think might live in that space. Then ask them to think about their own backyard. What pollinators might be able to find food, water and shelter in their backyard space? Explain that for our next activity they are going to have an opportunity to make something that can improve the habitat in their yard for the pollinators.



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Supplies

- Paper and markers or colored pencils, pollinators pictures provided with lesson, and glue sticks.

Optional supplies for activity choices

- Starting your pollinator garden – Long tray like container (can use paper egg cartons or planting cups) Flower seeds (you can purchase special seed packs that contain flowers especially for bees, butterflies, and hummingbirds), potting soil, and a spray bottle.
- **Bee bath and butterfly “puddler”** - Shallow pie pans, small rocks or marbles, small bucket, mesh, corks and staple gun, kitchen sponges.
- **Bee house** – small tree log or limb about 14” long and 4” thick. Scrap untreated $\frac{3}{4}$ ” board large enough to make a roof with about 3” overhang, drill and drill bits ranging from $\frac{1}{8}$ ” to $\frac{1}{2}$ ”, nails, hammer, small piece of rope to hang, and sandpaper.

Procedures:

1. Pass out paper and markers (colored pencils). Have the investigator draw their backyard or a space in their yard that they would like to improve for pollinators.
2. Next allow them to select pictures of the pollinators they would like to attract to their yard and glue them onto their picture.
3. Draw or list the food, water, and shelter that their pollinators will need to live in their space. For example: if they are attracting butterflies, they will need host plants for the eggs to be laid on and for the caterpillars to eat. They will need flowers that attract the adult butterflies. They would have a butterfly feeding station that holds pieces of fruit. They could add a butterfly house, large bushes or even trees for shelter and a water source like a shallow puddle area, butterfly sponge, or even a shallow pan filled with wet sand and a few small rocks.



Another example: if they selected bees as their pollinator, they could plant native flowers that bloom all year or a selection of flowers that bloom at different time of the year. They could create a bee bath for a water source and hang some bee houses for shelter.

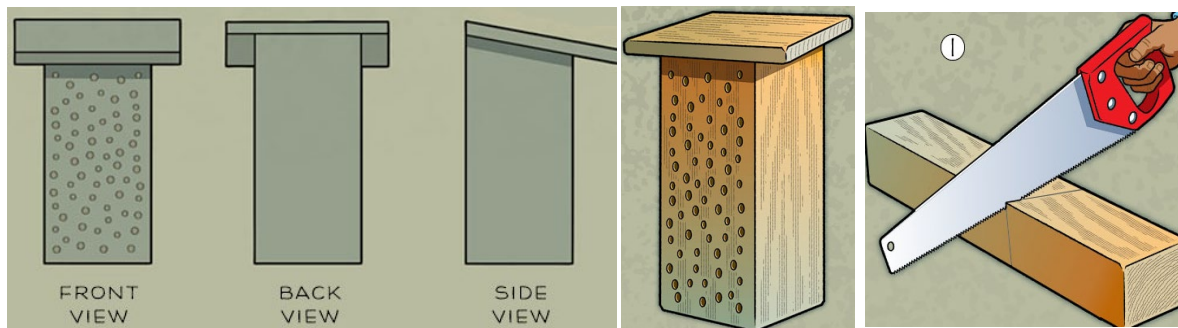
One last example: if hummingbirds are their choice, add native flowers, and plant flowers that bloom at different times or have a long blooming season. Hang hummingbird feeders and create perching areas with large dead tree limbs placed about 50 feet from your feeder. Add a mister to their yard, a mister is a water hose with fine holes that allow the water to shoot up and mist plants. Hummingbirds love to bathe in the fine spray of water. Leave spiderwebs; hummingbirds use the webbing to make their nest. Add bright red, or orange plastic tape or ribbon to a tree or garden area to get the hummingbirds attention and invite them into your garden.



Investigate, Create, & Take:

Once investigators have their pollinator habitat improvement plan, they can get to work and create their first habitat improvement project, see below for choices.

- **Starting your own pollinator garden** – Use prepackaged flower seed, which can be purchased with seeds selected to grow plants that attract the selected pollinator. For example, Hummingbird Garden seed. Allow Investigators to fill a paper egg carton (or long shallow container) with potting soil. Open seed packets and allow them to plant a variety of seeds in their container. Use a small spray bottle to lightly water their container. Once the seeds sprout, they can be transplanted into their garden space at home. If they used “paper” egg cartons or planting cups, the entire carton can be planted in their new garden area.
- **Creating a bee bath** – Option one - take a pie pan and fill it with small rocks or glass marbles. Fill the pan with fresh water and place it in a shady protected spot in your garden. Your bee bath water should be changed daily, and the pan cleaned once a week. Option two- take a small bucket; fill it with water. Take a piece of mesh and cut it to fit just inside the bucket. Staple corks around the edges of the mess so that it floats on the water. Bees can land on the mesh and still get a drink. Place in a shady protected spot in your garden. Fresh water should be added weekly.
- **Butterfly Puddler** – Butterflies get most of their water from the flower nectar they drink. They do need minerals and creating puddlers is a great way to provide them. Take a pie pan, layer dirt in the bottom, and arrange some small rocks or marbles in the pan for places for the butterfly to land. Take a kitchen sponge and cut it into various shapes. Place the cut-up sponge pieces between the rocks in the pan. Place a larger sponge in the center of the pan and wet all the sponges so that the layer of dirt stays damp. Place the puddler in a sunny protected area near flowers, and dampen the sponges as needed to keep soil damp.
- **Creating a bee house** - (takes the most time and supplies)



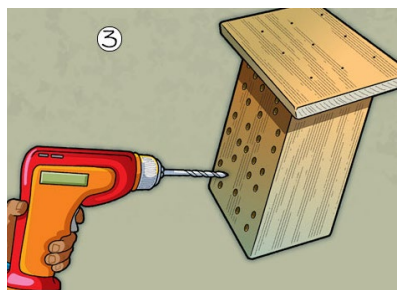
*Pictures from <https://boyslife.org/hobbies-projects/projects/140535/build-a-bee-house/>

1. Saw off one end of the board or log at an angle, so the roof will have a slant that will cause rainwater to run off. The longest length of the board or log should be about 14".



2: Nail on the roof. You need to keep the tunnel nests as dry as possible. Use nails to attach the roof.

3. Drill an assortment of 1/8" and 1/2" holes about 1/2" to 1" apart. Do not go all the way through the wood or log. Clean away any sawdust and smooth the openings with sandpaper.



4. Tie a small knot at each end of the rope. On each side of the bee house, attach the rope with a nail hammered through the knot. Match the two sides so the house won't tilt. Your bee house is complete and ready to hang.



Some additional tips for habitat improvement

- Use native plants if you want to attract native pollinators, avoid hybrids
- Avoid pesticide use
- Plant host plants if you want to attract butterflies and moths
- Plant flowers that bloom at night for moths and bats
- Plant larval host plants but remember the larvae will eat them and these plants can look weedy compared to flowers.

Snack idea: *Supplies needed:*

- Plastic cups (bright colors work well to represent flowers),
- White heavy-duty napkins- these will be cut into petal shapes, (It's best to have the petals pre-cut).
- Clear tape
- Cheese puffs (represents the pollen)
- A wrapped piece of candy (represents the nectar)

Give each investigator a cup, clear tape and enough petals to go around the outside of their cup. Allow them to tape on their petals. Next drop a piece of wrapped candy into the bottom of each cup and then fill the cup half full of cheese puffs. Then challenge them to find the candy without removing a single cheese puff from their cup. Once everyone has found their candy (nectar), have them examine their fingers and hands. Are they covered in orange cheese puff powder? (pollen) Explain that this is one way a flower attracts the pollinator. They hid a little bit of sweet nectar down deep in their petals and as the pollinator digs to find it, they get covered in pollen. Now have them look at their white petals. Did any of the pollen get on them? Explain that as the pollinator travels from flower to flower digging around for nectar, they transfer or spread the pollen from flower to flower. If you look around you just might see pollen on the table, floor or your clothes. Now, allow them to enjoy their cup of pollen.

Career Connections: *Wildlife Biologist, Landscaping, Botany, Entomology, Agriculture*



Make your own bee. Using large yellow balloons, blow up the balloon then release air. Using a funnel fill the balloon with flour. Tie off the end. Using black marker, draw face, and stripes. Leave wingless and use as a stress ball or you can cut out paper wings and tape them to the sides.

Go Over Findings:

Name 3 pollinators live in our neighborhood. (Answer: In Ohio we have bees, hummingbirds, moths, beetles, flies, and a few other insects that can act as pollinators.)

Why are pollinators important? (Answer: Without pollination, many flowers would not produce fruit or seed.)

What could I do if I wanted to attract pollinators to my backyard? (Answer: Any of the habitat improvements from activity 2 or other ideas Investigators may have.)

What is one thing you will do to help make habitat for pollinators? (Answers: can vary.)

Sources:

<https://www.birdwatchersdigest.com/bwdsite/learn/hummingbirds/attract.php>

<https://thehoneybeeconservancy.org/plant-a-bee-garden-2/>

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<https://www.gardeningknowhow.com/garden-how-to/beneficial/butterfly-garden-feeding.htm>

<https://boyslife.org/hobbies-projects/projects/140535/build-a-bee-house/>

<https://www.foxleas.com/make-a-bee-hotel.asp>

<https://www.nwf.org/NativePlantFinder/Wildlife/Butterflies-and-Moths>

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Ohio Pollinator page



Bees



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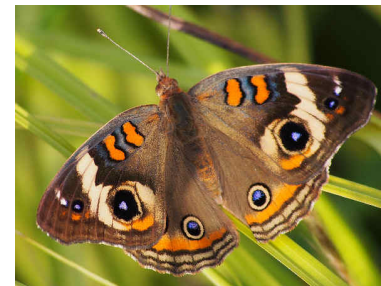
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**Moths****Beetles****Butterflies****THE OHIO STATE UNIVERSITY**COLLEGE OF FOOD, AGRICULTURAL,
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