

- Can you find any nectar? Brood? Honey?
- Can you find any drones and drone cells?
- Can you find the queen bee?

■ ***NOTE:** The queen in Observation Hive #1 has a yellow mark on her.

Put the wooden panels back on the observation hives and turn off the lights in the bee room. Go out the back door and look at the hives **from a distance**, making sure not to go past the barrier. Spend no more than 4 minutes out back.

- Ask, “What might affect honey bees?”
 - Use **Supplement B** to quickly discuss pesticides and other toxic chemicals, diseases, pests, parasites, and predators, humans.

Evaluate (4 – 8 minutes)

If you are here for an overnight program, start with giving the students their pollinator snack, then ask them evaluation questions. If you are here with a day program, give students a taste of local honey, then proceed to asking students the questions.

***For OVERNIGHT programs only (8 minutes)**

Walk back to the field and give each student a piece of organic fruit or vegetable that is local and in season (watermelon, apple, peach, pear, etc.) and a taste of local honey (see below). Have them thank the bees for this yummy treat! Then ask the students the following questions.

***For OVERNIGHT and DAY programs**

For students who would like to try a taste of local honey, put a small dollop on the end of a Popsicle stick. Then, ask the students the following questions to tie together the importance of pollinators.

1. **Humans can help the honeybee population by reducing our use of harmful...?**
Pesticides
2. **What kinds of plants should humans plant to assist native pollinators?**
Native plants
3. **What is it called when two organisms work together to get what they both need?**
Mutualism
4. **What do you think we could do to help the bees stay healthy?**
Plant bee friendly flowers and gardens, buy local, and buy organic, raise bees, and leave weeds such as dandelions for bees to use, opt for natural solutions over pesticides.
5. **Why are pollinators important to humans?**
They pollinate flowers which help produce fruits and vegetables.
6. **Why are honey bees and other pollinators important to the environment?**
Their unique roles as pollinators enables plants to produce food. They are also important parts of the food web. They create and maintain habitats.

Notes for clean up:

Please organize and return all supplies to the bee room. Please put the wooden panels back on the observation hives. Make sure any trash and compost makes it to their respective disposal places. Remember to inform the Arlington Echo Staff if you need assistance or if any materials are damaged or missing. Thank you!

Notes for Inclement Weather:

Arlington Echo encourages keeping our outdoor activities outdoors—even in the rain—but in the case of severe weather (thunder, severe cold, etc.), the rain location will be inside the Bee room.

Supplement A: Bee Cards – Members of the Colony

<p>Worker bees – Card 2</p>	<ul style="list-style-type: none"> ● Are worker bees females or males? FEMALES ● Workers make up the majority of the hive. ● They live for an average of 48 days. ● Their jobs include cleaning the hive, taking care of the Queen, and going outside to collect pollen/nectar for the hive. ● What is all over this bee’s body? Pollen ● Why? What is this worker bee doing? Pollinating
<p>The Queen – Card 5</p>	<ul style="list-style-type: none"> ● Are all the bees in this picture the same? Which one is different? <i>The bee in the center is the queen. She is significantly longer.</i> ● There is only one queen bee in a hive. ● Her sole job is to lay eggs. ● A queen bee usually lives 1 to 2 years.
<p>Drones Bees – Card 10</p>	<ul style="list-style-type: none"> ● Are drones male or female? MALE ● There are not many drones in a hive. ● They live about 60 days. ● Their only job is to fly out and mate with the queen of another hive. ● The drones get kicked out of the hive during winter in order to preserve resources.
<p>Brood - Card 6</p>	<ul style="list-style-type: none"> ● A queen is the only female bee to lay eggs. She lays 1,200 to 2,000 eggs per day! ● The brood (eggs) is normally located in the center of the hive where the temperature kept at 94° in order to keep the brood warm. <ul style="list-style-type: none"> ○ How is this a Structure for Survival? <i>The worker bees keep the developing bees protected from the outside temperatures, which could possibly freeze and kill the brood.</i>
<p>Beekeeper – Card 12</p>	<ul style="list-style-type: none"> ● This beekeeper is examining one of his hives. What type of tools do you see him using? <i>Hive tool and smoker.</i> The hive tool is used to crack open the hive, which is glued shut with propolis, a substance that bees make by eating tree sap. <ul style="list-style-type: none"> ○ How is propolis a Structure for Survival? <i>This sticky, glue-like substance is used to seal any gaps in the hive. It prevents air and moisture from getting into the hive and ruining the honey.</i> ● Is the beekeeper wearing any protective gear? <i>Yes, a helmet and veil.</i> The helmet and veil prevents the bees from flying into the beekeepers nose, ears, or mouth. Normally, a beekeeper will wear a lot more protective gear.

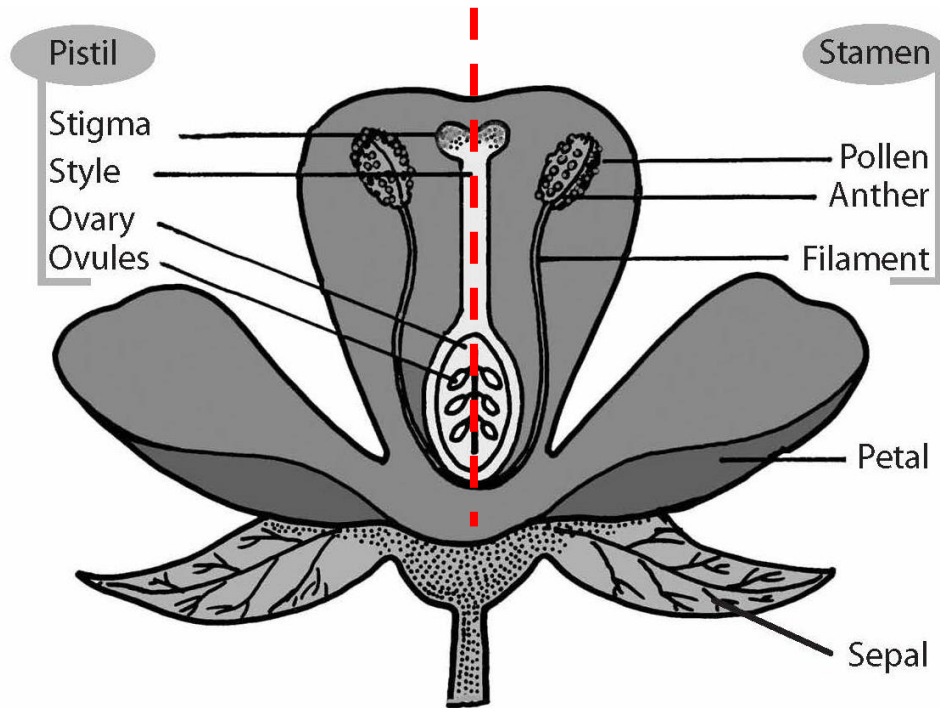
Supplement B: Bee Issues

- Pesticides
 - There are different kinds, but many are toxic to bees either killing them directly or harming young bees when brought back to the hive.
- Diseases
 - Diseases bees can contract include bacterial, fungal, viral diseases, and dysentery.
- Pests, Parasites, and Predators
 - Pests: bee lice, wax moths, ants, and mice.
 - Parasites: Varroa mites
 - Predators: small hive beetle, Giant European Wasps, skunks, and bears.
- Colony Collapse Disorder
 - A mass disappearance of worker bees in the hive, resulting in the collapse of the hive due to not having enough workers to support honey and comb production or care of brood.
 - The exact cause of CCD is unknown, but it is possible that it is a result of the hive dealing with a combination of issues at once.
- Humans
 - Use of pesticides on crops and flowering trees.
 - Planting non-native plants that don't produce the nectar and pollen needed for survival.
 - Destruction of honey bee habitats.

Supplement C: Proper Use of Prism Microscopes

- Prism microscopes rely on the light of the sun rather than electric light to see slides.
- If it is overcast and there is not much sunlight, you can use flashlights as the light source. Show students how to shine the light onto the prism piece.
- Instead of turning knobs to focus, slide the eyepiece up and down slowly. Once the image is in focus, move the slide around to find pollen.
- During OVERNIGHT programs, use the plastic slides with the small concave center. The students can put any pollen and/or interesting bugs they find on these slides and view them under the microscope.
- During DAY programs, glass prepared slides should already be set up for viewing. Students should not handle these slides.

Supplement D: Parts of a Flower/Vocabulary



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Vocabulary:

Petal – outer sections of the flower

Stem – main stalk of the plant

Pistil – part of the flower that produces seeds

Stigma – sticky part at the top of the pistil that catches the pollen from another plant

Style – long part of the pistil between the stigma and the ovary

Stamen – part of the flower that produces pollen

Filament – part of the stamen that supports the anther

Anther – part at the top of the stamen that produces the pollen

Ovary – large part of the pistil that produces the ovules

Ovules – when the ovules are fertilized by pollen, they become the seeds

Supplement E: Human vs Bee eye

