

# POLLEN NATION FAST FACTS

## Brief Flower Description

- The sepal protects the flower.
- Petals attract pollinators.
- The male part of the flower is the stamen, which is made up of the anther that holds the pollen, and the filament, with is the long narrow stalk that the anthers sit on.
- The female part of the flower is the pistil, which is made up of the stigma, which is the opening at top of the female part of the pistil. The stigma sits on top of the style, which is the long tube leading to the ovary, which contains the

female genetic material. Nectar is sugary sticky substance inside the style and ovary that pollinators seek.

- After it is fertilized by pollen, the ovary turns into fruit. Fertilized seeds are found inside the ovary.
- When animals and people eat fruit, the seeds get distributed through their feces.

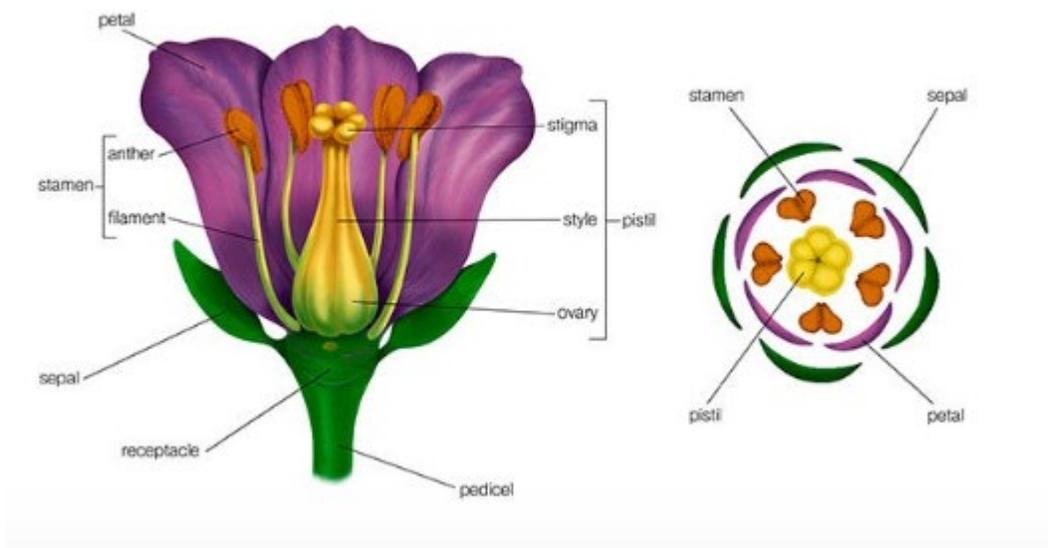


Image from: <https://www.natgeokids.com/za/discover/science/nature/the-life-cycle-of-flowering-plants/>

- Pollen is the male genetic matter of a plant.
- Pollen can cause allergies in some people, which is referred to as hay fever. Many trees, grasses, and weeds rely on the wind to disperse pollen which fertilizes the female parts of other plants.
- Pollinators are bees, flies, beetles, butterflies, moths, and some species of bats and spiders who have symbiotic relationships with the flowering plants. Pollen counts measure how much pollen is in the air to help people with allergies predict how bad their symptoms might be.
- Generally, there is more pollen in the morning, and on warm, dry, breezy days. There is less pollen when it is chilly and wet.
- Honeybees use nectar to make honey. Honeybees eat pollen to produce food for young bees.
- Pine Pollen, or “yellow snow” can be overwhelming in the spring and fall, but it is not the source of most people’s

pollen allergies.

- Some plants like soybeans, wheat, and pine trees use wind to pollinate. They do not require pollinators.
- Most people think of bees, butterflies, and hummingbirds when they think of pollinators. Wasps, flies, beetles, moths, some bats, and even a few spiders may be pollinators.
- Bees have five eyes, two compound eyes for seeing during the daylight, and three ocellus (or ocelli) eyes that help them see in the dark and inside the hive.
- Bees have a covering that looks like fur, but it more accurately referred to as called **setae**.
- Although honeybees live in complex social structures called hives, many other species of bees lead solitary lives.
- Bees communicate locations of flowers by doing a dance called a waggle, which shows the other bees in which direction and how far away the flowers are.
- Worker bees and queen bees are female. Drones are male. Only queen bees may lay eggs, and she is the mother to the worker bees.
- When a honeybee or bumblebee stings, its stinger tears part of its abdomen, which means the bee will die. Many hornets and wasps are able to sting multiple times without injuring themselves. Some bees have no stingers.
- There are many types of parasitic wasps, in which the female wasp stings and immobilizes a host insect. Then she lays her eggs inside the paralyzed host. The eggs hatch into larvae that eat the host animal alive from the inside out. My favorite parasitic wasp in NC is the Cicada Killer. <https://entomology.ca.uky.edu/ef004>

### Bee Body Structures

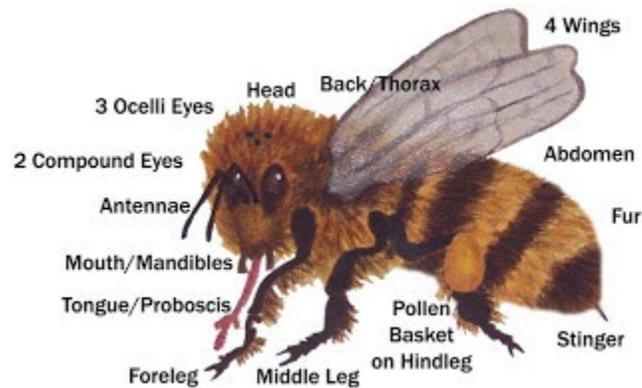


Image taken from: <http://bee-magic.blogspot.com/2010/06/parts-of-bee-body.html>

### Science Vocabulary

- Pollen: the male genetic material of plants.
- Angiosperm: a flowering plant.
- Gymnosperm: a conifer/pine cone producing plant.
- Pollinator: an animal that transports pollen during its activities like eating nectar.
- Anther: the structure that produces pollen inside a flower.
- Stamen: the filament or tube that supports the anther.
- Pistil: the female structure of a flower.
- Stigma: the top opening in the pistil of a flower.
- Style: the tube on the pistil that supports the stigma.
- Ovary: the female genetic structure of a flower.
- Trachea mite: a parasite that attacks honeybees.
- Honeybee: a general term for bees brought from Europe to produce honey for people to consume.
- Native bees: wild bees that have co-evolved with native plants to be their pollinators.
- Moth: a pollinator similar to a butterfly, but which has a fuzzy body and feathery antennae. Some moths are nocturnal.
- Butterfly: an insect pollinator that has two sets of large wings with powdery scales that are often colorful.

- Wasp: a type of bee that preys upon other insects.
- Fly: an insect that has two small wings, a broad body, large, compound eyes.
- Bat: a flying mammal, many of which eat insects. But the fruit bat is an example of a pollinator for bananas.
- Colony Collapse Disorder: a new and alarming trend in which worker bees go missing so that the queen and young bees eventually die and the hive dies.
- Mutualism/Symbiosis: a mutually beneficial relationship between two organisms. Bees obtain food from flowers and provide a means of transferring genetic material for plants.
- Parasitism: a relationship which is beneficial to the parasite, but which harms the other host organism. In honeybees, the trachea mite lives in the airway of the bee and consumes the bee's blood. The mites harm the bees by blocking airflow into the bee, and weakens the bees.
- Proboscis: the long tongue that bees and butterflies use to get nectar from inside a flower.
- Pesticide: a chemical used to kill insects to protect plants. Sometimes pesticides can cause unintentional harm to pollinators.
- Integrated Pest Management: an approach to treating plants for pests by minimizing chemical use.

### Insect Basics

- Insects are the most numerous animals and most diverse animals on earth.
- Insects have three body parts, a head, thorax, and abdomen.
- Insects have jointed legs, usually two sets of wings, an exoskeleton (no backbone), and mouth parts called mandibles.
- Insects may have more than two eyes. They often have compound eyes with multiple lenses.
- Insects communicate with each other through chemical signals called pheromones, like a stink bug, with body language, like the waggle dance in bees, by touching antennae, like an ant, and by sound, like a cricket.
- Insects usually go through metamorphosis or incomplete metamorphosis, which means they start out as eggs, hatch into larvae, either go into a cocoon or not, then turn into an adult. Some insects lay their eggs in water, like dragonflies or mosquitoes.
- Some insects have complex social structures like honeybees. Other insects are solitary. Some insects care for their young, like honeybees and ants. Some insects mate and parent their young together, like Bess Beetles. Many insects do not take care of their young.

### Printable Handouts

1. Student Handouts parts 1 – 5.
2. STEM To-Go
3. A good site for flowering plants: <https://www.natgeokids.com/za/discover/science/nature/the-life-cycle-of-flowering-plants/>

### Kid-Tech Spot: Supplemental interactive websites and games

1. An interactive bee game for elementary: <http://www.primarygames.com/science/insects/games/beeempire/>
2. Bees and Wasps of NC: <https://www.insectidentification.org/insects-by-type-and-region.asp?thisState=North+Carolina&thisType=Bee%2C+Ant%2C+Wasp+and+Similar>
3. Video of Bees doing the Waggle Dance, complete with breakdown on angles and patterns. <https://www.youtube.com/watch?v=-7ijl-g4iHg>
4. For older participants: <https://www.youtube.com/watch?v=tcXkQBY0iOk>
5. Department of Environmental Quality's pollen monitoring site: <https://deq.nc.gov/about/divisions/air-quality/air-quality-monitoring/pollen-monitoring>

### More Resources, Just in Case

1. A primer on Integrated Pest Management from Lowe's: [https://www.lowes.com/cd\\_Pesticide+Alternat\\_1262199800](https://www.lowes.com/cd_Pesticide+Alternat_1262199800)

### Resources for Teachers:

1. A great bee matching game with full colored illustrations, ready to laminate, and NC specific! [http://ecoipm.org/wp-content/uploads/plans\\_bee\\_matching\\_game.pdf](http://ecoipm.org/wp-content/uploads/plans_bee_matching_game.pdf)
2. This site describes how pollen is counted.

[https://files.nc.gov/ncdeq/Air%20Quality/monitor/pollen/Pollen\\_Counting.pdf](https://files.nc.gov/ncdeq/Air%20Quality/monitor/pollen/Pollen_Counting.pdf)

3. This site has information about alternatives for pesticides.

[https://www.lowes.com/cd\\_Pesticide+Alternat\\_1262199800](https://www.lowes.com/cd_Pesticide+Alternat_1262199800)

### In the News

1. Pine Pollen is not the cause of most allergies: <https://www.newsobserver.com/news/local/article207683024.html>
2. Global Warming is increasing pollen counts, length of pollen seasons, and increase in allergies. <https://www.vox.com/2019/4/8/18300342/pollen-season-2019-allergies-climate-change>

### On the Road

1. Piedmont:
  - a. SEEDS, Durham, NC: <http://www.seedsnc.org/>
  - b. NC Botanical Garden, Chapel Hill, NC <http://ncbg.unc.edu/>
  - c. Sarah P. Duke Gardens, Durham, NC: <https://gardens.duke.edu/>
  - d. Greensboro Botanical Gardens: <http://www.greensborobeautiful.org/>
  - e. UNC Charlotte Botanical Gardens: <https://gardens.uncc.edu/>
2. Coastal Plain:
  - a. Airlie Gardens, Wilmington, NC: <http://airliegardens.org/>
  - b. Cape Fear Botanical Garden, Fayetteville, NC: <https://www.capefearbg.org/>
3. Mountains:
  - a. Asheville Botanical Gardens: <https://ashevillebotanicalgardens.org/>

### Other Lessons and Reference Materials Used to Develop this Unit

<https://ento.psu.edu/pollinators/resources-and-outreach/what-are-pollinators-and-why-do-we-need-them>

<https://www.slideshare.net/MeredithWojcik/pollinators-and-their-plants-kids-1>

<https://www.annettewhipple.com/2017/01/pollination-activity.html>

[https://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=84&search\\_term\\_lp=pollination](https://www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=84&search_term_lp=pollination)

<http://www.thefirstgraderoundup.com/2018/10/stem-challenge-pollinators.html?m=1>

[https://naitc-api.usu.edu/media/uploads/2015/01/20/AnatomyofaWorkerBee\\_Answers.pdf](https://naitc-api.usu.edu/media/uploads/2015/01/20/AnatomyofaWorkerBee_Answers.pdf)

<https://carolinahoneybees.com/why-pollen-is-vital-for-honeybee-survival/>

<https://masonbeesforsale.com/pages/top-nesting-materials-for-solitary-bees>

<https://thehoneybeeconservancy.org/why-bees/mason-bees/>

<https://www.perfectbee.com/learn-about-bees/the-life-of-bees/role-queen-bee>

<http://bee-magic.blogspot.com/2010/06/parts-of-bee-body.html>

<https://kidshealth.org/en/parents/seasonal-allergies.html>

<https://kidshealth.org/en/kids/allergies-asthma.html?WT.ac=p-ra>

<https://greensideup.ie/what-can-i-plant-in-my-garden-to-attract-honey-bees/>

[http://ecoipm.org/wp-content/uploads/plans\\_bee\\_matching\\_game.pdf](http://ecoipm.org/wp-content/uploads/plans_bee_matching_game.pdf)

<https://pollinator.org/list-of-pollinated-food>

[https://www.lowes.com/cd\\_Pesticide+Alternat\\_1262199800](https://www.lowes.com/cd_Pesticide+Alternat_1262199800)

[https://www.sargentwelch.com/www.sargentwelch.com/images/Bess\\_Beetles.pdf](https://www.sargentwelch.com/www.sargentwelch.com/images/Bess_Beetles.pdf)

<http://www.primarygames.com/science/insects/games/beeempire/>