

## Natural Biology of the Garden

[the garden as a biome]

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for

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The study of natural biology is infinite in its interdependencies, synergies, collaborations and resulting diversity. Instead of attempting to organize, tame or eliminate natural habitats and their environmental needs, **we should observe, experiment, observe again, and foster conditions** that will encourage the basic elements of a biome to exist. All we need to do is spend time outside – at a park, in our yard, at a nearby area where there are a variety of plants and trees, and not many people. Sit quietly for 15-20 minutes and see what happens. Who comes to visit? From the sky, out from under a bush, up in the trees, close to the ground – all of these areas support some form of living creature.

Draw a picture, keep a journal, take a photo, listen - or just sit and observe.

Here in Columbus, we live in an urban or sub-urban setting, so space is at a premium. It is also important to consider our human neighbors by maintaining our outdoor environment. This could mean not allowing wasps to nest in large numbers, or rats to encroach on a compost pile. As a rule, it is not wise to feed or harbor encroaching wild animals such as deer, foxes, racoons, rabbits or even squirrels. This is due partly because you will be altering their instincts for survival making them dependent on you, and also because they interact with the environment in a way that they could harbor diseases.

For example, don't feed birds year-round. It is natural for birds to forage for seeds, nectar, pollen, insects, prey or carrion most of the year. Only in the coldest part of the winter is it helpful to provide food for over-wintering species.

St. Stephen's hosts a number of wild rabbits. Just venture [quietly] from the parking lot towards the North door of the church. You will usually see a bunny hopping out of the butterfly/pollinator garden. It has been difficult to establish plants in the raised area of concrete that supports the porch roof. Why? Those same bunnies! That is why you will see plastic forks stuck in the ground surrounding the beautiful flowering plants. This is a simple way to discourage foraging without using traps or chemical repellents. This technique also works against browsing deer.

How can we encourage birds, insects, bats, and other small animals to find a home in our urban setting?

Understanding what plants provide for a range of garden visitors will help in planning your garden environment.

<https://www.gardenersworld.com/how-to/grow-plants/nectar-and-pollen-throughout-the-year>

Something as elemental as a water source is key during the summer months. This can be a simple bird bath, or a small fountain. There are also solar fountains for sunny locations.

[https://www.etsy.com/market/solar\\_bird\\_bath\\_fountain?ref=lp\\_queries\\_external\\_top-1](https://www.etsy.com/market/solar_bird_bath_fountain?ref=lp_queries_external_top-1)


Not everything that grows in your garden will be helpful in attracting a variety of birds and butterflies, for example. This is because some plants grow more easily than others, requiring little to no care. These will often over-populate the garden, robbing a wider variety of plants of their soil and water nutrients. So, pull out excess plants that habitually 'take over', lightly till the soil, and seed different varieties, or a mix of seeds.

Imagine that you have no arms, legs, mouth, or eyes. That is how plants are – they cannot walk; they cannot pick up their food and consume it like animals do; and they do not 'see' the world around them. Why are they so plentiful, and important?

Understanding how plants 'operate' will help you understand how vital they are to a healthy planet. Basically, plants make the food come to them by having root systems that capture rainwater and leaves that capture solar energy. They can multiply by attracting pollinators with beautiful flowers, or seeds, or providing important shelter for nesting animals. In turn, these animals, insects, and birds help the plant grow, and create new plants.


<https://www.pollinator.org/pollinators>

Pollination sounds very complicated, but in a sense, every creature is a pollinator. If you walk through your garden and brush against a flower picking up some pollen on your clothes or your arm. You then may brush against another plant, thus transferring some pollen to a neighboring plant. This may or may not make a difference since successful pollination will only occur between receptive plants. That is to say, plants can pollinate different varieties within a species, but not across species.




# FLOWERING PLANT LIFE CYCLE

## How Plants Grow and Reproduce



**Honey Bee**  
Apis mellifera


Honey Bees pollinate many flowering plants that we rely on for food.



**Flower Parts**


- Petal
- Pistil
- Stamen
- Petal
- Pistil
- Fruit
- Seed

### FLOWER POLLINATION



**INSECT POLLINATED FLOWERS**

Insect pollinated flowers have features that allow insects to pollinate them when they feed on the nectar. The pollen grains will stick onto the outer covering of the insect and when the insect brushes past the stamen of the same flower or another flower, the pollen grains will stick onto the pistil of the flower and pollinate the flower.



**WIND-POLLINATED FLOWERS**

Corn, wheat, rice, barley and other grasses are wind-pollinated plants. They have lightweight pollen in large quantities, pollen grains fall off when wind blows and then falls onto the pistil. These plants don't require insect help, so they don't invest energy in making big, colorful flowers and nectar to attract them. They have small, barely noticeable flowers.

**Pollination**  
Flowers are pollinated when pollen from the stamen moves into the pistil. Seeds and fruit are produced.

**Fruit**  
Fruit contains the seeds. Animals eat the fruit and spread seeds to new locations.


**Seed**  
Seeds hold a tiny plant with stems, roots, and root parts, plus a food supply.

**Germination**  
Rain, sun, and soil help sprout the new seed.

**Leaves**  
Plants absorb sunlight through leaves. Sunlight, water, and nutrients from the soil help the plant make its own food. This is called photosynthesis.


**Roots and Stem**  
Roots grow down into the soil anchoring the plant and absorbing water and nutrients. Stems support the plant and push it up toward the sunlight.

### SEED DISPERSAL TYPES



**THE WIND BLOWS SEEDS**

Seeds from plants like dandelions, milkweeds and cottonwood trees are light and have feathery bristles and can be carried long distances by the wind. Some plants, like maple trees, have "winged" seeds. They don't float away but flutter to the ground.



**BIRDS AND ANIMALS HELP DISTRIBUTE PLANT SEEDS**

Birds and Animals disperse seeds in several ways. Some plants produce their seeds inside fleshy fruits that then get eaten by birds and animals. The seeds are later pooped out in a new location. Some plants, like the burr have barbs or other structures that get tangled in animal fur or feathers, and are then carried to new sites where they can start growing.

A plant starts out as a seed buried in the ground. As water falls on the seed and the sun warms it, its hard shell opens and it starts to grow out its roots. As the plant grows, its stem bursts through the soil. Then, leaves start to grow out of the stem. As the plant gets bigger it will begin to grow buds, which later sprout into flowers, and sometimes those flowers turn into fruit! As bees feed on the nectar, they pollinate the plants, allowing more seeds to be made and scattered to grow again.

**Flowers**  
Many plants produce flowers that are important in making seeds.

Plants take in carbon dioxide and release oxygen.

Bean Flower

Bean Pod

Seed Coat

Tray Piece

Food Supply

Bean Sprout

Stem

Cotyledon

Roots

Bean Seedling

First Leaf

Second Leaf

Third Leaf

Fourth Leaf

Adult bean plant with flowers and fruit.

First Leaf

Cartilage

Bean Adult

First Leaf

Second Leaf

Third Leaf

Fourth Leaf

Roots

Stem

Leaf

Bean Seedling

First Leaf

Second Leaf

Third Leaf

Fourth Leaf

# WELCOME TO THE POLLINATOR GARDEN!

## Providing Native Plants for Native Pollinators



**Eastern Tiger Swallowtail**  
*Papilio glaucus*



**POLLINATORS AT WORK**

Many flowering plants have evolved over time to reflect the form and habits of their pollinators. Bee-pollinated plants are often irregular in shape, with a lipped "landing pad." Butterfly-pollinated flowers tend to be broad and flat like helicopter pads. Bats require open flowers with room for their wings, and hummingbirds and honeycreepers pollinate tubular flowers.

Flowering plants use fragrance and color to attract butterflies, moths, flies, bees, bats and hummingbirds. Most of these pollinators come to drink nectar—the energy-packed sugary liquid flowers produce. The plant's pollen (powdery seed dust) rubs off onto the gentle feet, wings and bodies of pollinators as they drink. The pollen is moved from flower to flower, helping the plants to reproduce by making fruits and seeds.



**Vicinity**  
*Loenetis archippe*



**Monarch Butterfly**  
*Danaus plexippus*



**Hummingbird**  
*Amazilia*



**Bumblebee**  
*Bombus*



**Trumpet Vine**  
*Campsis radicans*



**Lanceleaf Coreopsis**  
*Coreopsis lanceolata*



**Blue Mistflower**  
*Conoclinium coelestinum*



**Blue False Indigo**  
*Baptisia australis*



**Honey Bee**  
*Apis mellifera*



**Green Sweat Bee**  
*Agropostemon*



**Carpenter Bee**  
*Xylocopa virginica*



**Hummingbird Moth**  
*Hemerocallis*



**Great Black Wasp**  
*Vespa maculipes*



**Pill Wasp**  
*Dacnusa*



**Cardinal Flower**  
*Lobelia cardinalis*

**MONARCH POPULATIONS ARE IN DECLINE**

The widespread use of herbicides in croplands, pastures and roadsides is contributing the decline of many butterfly species, including the Monarch Butterfly. For the past decade, Monarch populations have been dropping dramatically.

Scientists estimate that the highest population of Monarchs ever recorded was 910 million in Mexico in 1996. The lowest population recorded was 34 million in 2014. How do they know?

Every winter, they measure the area of the forest covered by monarchs in the overwintering sanctuaries in Mexico. Scientists measure area because estimates of individual butterflies in a colony vary too widely to be reliable.

**What Can You Do To Help?**

- Plant native milkweed and nectar plants to help provide habitat, especially during fall migration.
- Avoid pesticides. These chemicals kill monarchs at all stages of the life cycle.
- Volunteer for tagging and report your observations.
- Support beneficial farming practices.
- Contribute to conservation efforts.
- Support organizations that protect monarch habitat on the breeding grounds, along the migration route, and at the overwintering sanctuaries in Mexico.



**Common Milkweed**  
*Asclepias syriaca*

**Silphium laciniatum**  
*Silphium laciniatum*

Monarch butterflies cannot survive without milkweed plants. The females lay their eggs exclusively on milkweed plants because it is the only food source their caterpillars will eat once they hatch. After eating through milkweed the caterpillars then find a place to hang upside-down and change into a chrysalis. Inside the chrysalis the caterpillar will then metamorphose into an adult butterfly.

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In general, it is recommended to have a good selection of plants native to your region. This is because they will grow more easily, and they will naturally provide food and shelter for your local garden inhabitants, encouraging them to thrive!

<https://www.fs.usda.gov/wildflowers/pollinators/documents/AttractingPollinatorsV5.pdf>

Our local libraries are a rich source of books for natural biologists, and gardeners. Also, the reference librarian at your favorite library branch may recommend a variety of resources, both printed, and digital as well as some possible field trips.

Here is a link to a book I found at Whetstone library about plants native to this region.

[https://www.amazon.com/Midwest-Gardeners-Handbook-2nd-maintain/dp/0785839526/ref=asc\\_df\\_0785839526/?tag=hyprod-20&linkCode=df0&hvadid=564700705830&hvpos](https://www.amazon.com/Midwest-Gardeners-Handbook-2nd-maintain/dp/0785839526/ref=asc_df_0785839526/?tag=hyprod-20&linkCode=df0&hvadid=564700705830&hvpos)

[=&hvnetw=g&hvrnd=4147101760335765644&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmidl=&hvlocint=&hvlocphy=9014973&hvtargid=pla-1498621085503&psc=1](https://www.fpcconservatory.org/)

Greater Columbus has many wonderful parks and outdoor spaces. Whetstone Park, for example, has a restored prairie with meandering paths where you can explore some very tall, native plants in summer, observe a variety of birds including hawks and occasionally a bald eagle, and many butterflies.

Franklin Park Conservatory offers many naturalist programs, classes and exhibits.

<https://www.fpcconservatory.org/>

We are all natural biologists because we are all part of the great web of creation which extends in every direction, and affects everything that we are and everything that we do. Now, go outside and be part of this grand design.