

# TROPICAL CONSERVATORIES

Tropical rainforests are characterized by wet, hot conditions. The Earth's tropical rainforests are all located near the Equator. The most known rainforests are the Amazon in South America, the Congo Basin in Africa, and Southeast Asia. These locations are known as "biodiversity hotspots" as they are estimated to support 50% of Earth's plants and animals.

The New England Botanic Garden's conservatories, Orangerie and Limonaia, have been created to replicate the climate of subtropical rainforests. The Orangerie is kept at a temperature of 60-70°F and the Limonaia is kept at 55-65°F with less humidity. Almost all the plants within the conservatories are naturally found in rainforests, and have many of the same adaptations to survive in the warm, wet conditions.



Bromeliad

## HIGH IN THE TREES

The rainforest is a crowded place to find a place to grow. It takes many tough years to grow from the soil, so some plants have adapted to grow without soil. These plants are known as "epiphytes". The name comes from the Greek words "epi" meaning upon and "phyte" meaning plant. In the canopy, plants like bromeliads, orchids, and moss grow amongst the branches to survive. Since they live amongst the canopy, epiphytes are able to receive sufficient sunlight and water. Bromeliads have even adapted to collect and hold rainwater within its leaves, called the "tank", a perfect shelter for frogs and other animals.

The ability for a plant to grow on another plant is a unique adaptation. How do you think these plants evolved to be epiphytic? Write your thoughts below.

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Bird of Paradise



Snake Plant



# WILDLIFE REFUGE POND

Our wildlife pond is home to a variety of species from turtles, frogs, waterfowl, and the occasional mammals like muskrats or fishers. This pond has become an important area on the property for animals and plants alike allowing visitors to take a peak into the web of life that the pond creates.

There are several symbiotic relationships at the pond. Symbiotic relationships are interactions between two organisms. These interactions can be positive, negative, or neutral. Use your phone to define the following words: mutualism, commensalism, and parasitism. Identify each of the symbiotic relationships below by circling the correct word and then describe why it is that relationship.

Green Frog (*Lithobates clamitans*) + Lily pads (Nymphaeaceae):

Mutualism

Commensalism

Parasitism

Why?

Cattails (Typhaceae) + Red-winged Blackbirds (*Agelaius phoeniceus*):

Mutualism

Commensalism

Parasitism

Why?

North American Ash trees (Fraxinaceae) + Emerald Ash Borer (*Agrilus planipennis*):

Mutualism

Commensalism

Parasitism

Why?

Take a look at the ash wood used to build the pavilion. Can you find any evidence of the Emerald Ash Borer?





# GARDEN OF INSPIRATION

Most of the plants found in the Garden of Inspiration are native to Massachusetts, meaning that they have grown and adapted to New England's climate. Native plants usually adapt to native pollinators, so this is a great garden to see a range of pollinators other than the non-native honeybee. All the bees listed below use a technique known as "buzz pollination". The bees vibrate their flying muscles in their thorax (the center body part) to loosen the pollen found on the flowers' stamens. Many species of bees also have pollen baskets on their hind legs. This feature allows bumble bees and carpenter bees to pack in pollen and easily transport it to other flowers and back to their homes. Bumblebees and carpenter bees moisten the pollen to make it more compact to carry, but sweat bees and furrow bees do not. Their technique of dry external pollen transport leads to more pollination between flowers because the pollen easily falls off rather than staying put in pollen baskets.

REVIEW the 4 species below and see if you can take a photo of one in the Garden of Inspiration and observe their movements from flower to flower.



Eastern Bumble Bee  
*Bombus impatiens*

- black with a yellow thorax
- short hairs all over
- Size: 1/3 - 2/3 inches
- live in underground social colonies
- very peaceful
- pollinates many crops



Northeastern Sweat Bee  
*Augochloropsis viridula*

- metallic green body
- Size: 1/4 - 1/3 inches
- solitary bee
- lives underground
- speckled eyes
- attracted to sweat to lick the salt and moisture



Carpenter Bee  
*Xylocopa virginica*

- hairy yellow thorax
- shiny, hairless abdomen
- Size: 3/4 - 1 inch
- live in wood like trees, decks, fences, etc
- Chew holes in wood with their mandibles
- strong, clumsy flyer



Ligated Furrow Bee  
*Halictus ligatus*

- Large heads
- Thin, long abdomen with white and black stripes
- white hair on body
- Size: 1/4 - 1/3 inches
- often found pollinating asters and tiny flowers

Make sure to stay calm and still if a bee approaches. They are interested in flowers and making sure you are not one they should pollinate.



## INVASIVE SPECIES AT THE GARDEN

Invasive species are non-native organisms that harm the environment around them. They can destroy and change habitats and displace native species who become out-competed or killed. Through human activities and climate change, invasive species continue to be an issue so these are not the last of invasive species we will have here at the Garden.



Hemlock Woolly Adelgid  
*Adelges tsugae*

Aphid-like invasive species that feeds on the sap & nutrients of hemlocks. It creates white, cotton-like masses on branches.



Oriental Bittersweet  
*Celastrus orbiculatus*

Vine that strangles trees and shrubs, breaks branches, and shades out understory plants.



Mugwort  
*Artemisia vulgaris*

Displaces native species because it spreads aggressively. It can produce thousands of seeds and has an extensive rhizome system to help it spread.

## CLIMATE CHANGE INITIATIVES

In hopes to reach our sustainability goals and to do our part to curb climate change, we created the Climate Garden in 2021. This is a hands-on, youth-oriented garden that implements horticulture practices to reduce our greenhouse emissions and our usage of resources.

In this garden you will find, plants that we eat, plants that increase biodiversity, and plants that improve soil health. All are important to have a productive garden. You will notice that all our beds are companion planted to conserve space, have drip irrigation to reduce water waste, and all gardening is done by hand without the usage of electric equipment.



This is not our only sustainable initiative, so go to [neb.org](http://neb.org) and search "Sustainability at the Garden". List two initiatives that the Garden does below.

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