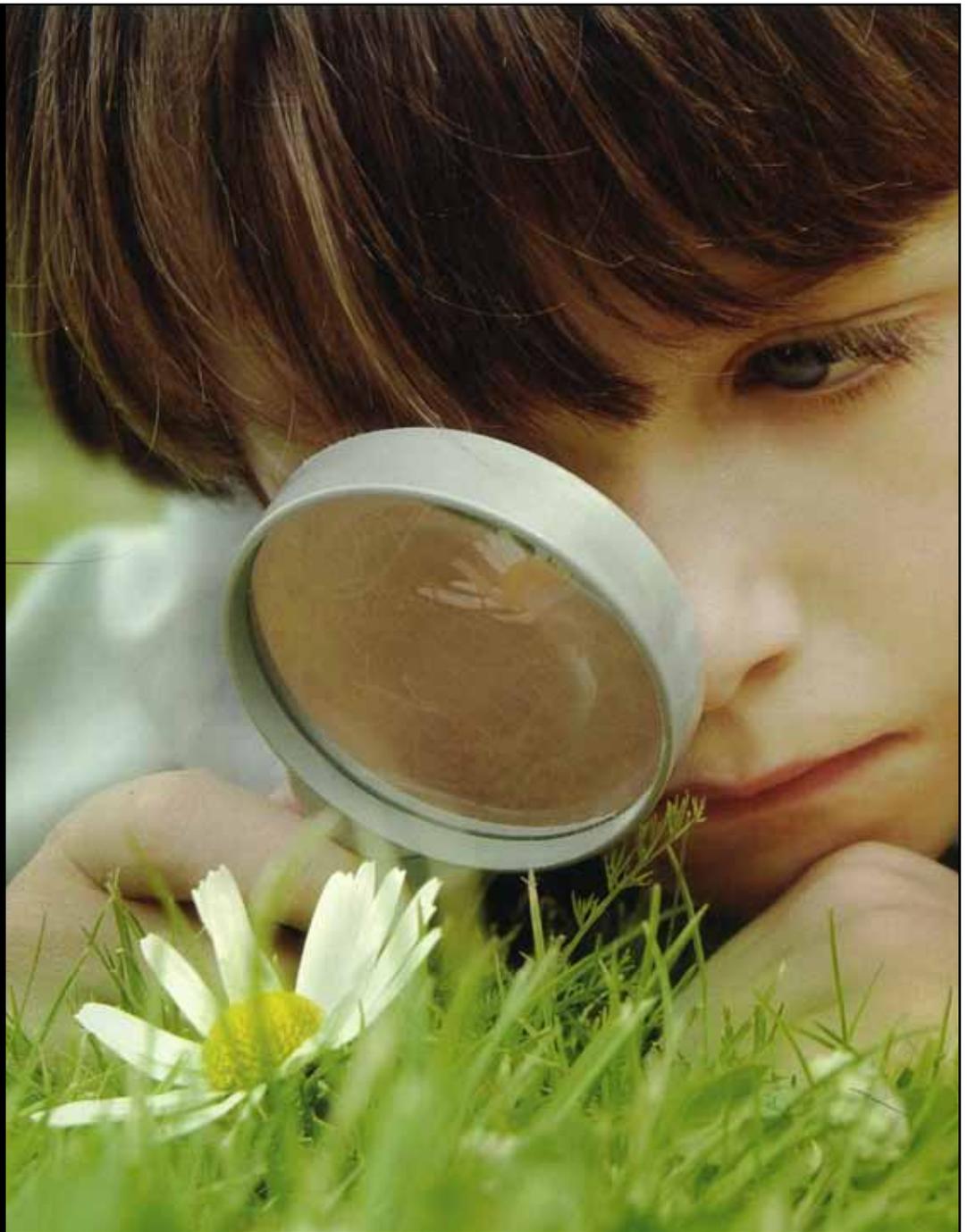


GARDEN TOUR

COLLECTION TOUR

IN THIS GUIDE:

- Before Your Visit
- Garden Map
- Botanical Beginnings
- Garden Basics
- Trees, Plants and Flowers
- Photosynthesis
- Habitats, Ecosystems and Biomes
- Water Cycle
- Vocabulary
- Classroom Activities
- Curriculum Connections
- Resources



GARDEN ADVENTURE

On this interactive tour, students will explore Cheekwood's Botanical Garden as they discover plants, animals, habitats, biomes, conservation and the environment. This guide has been created for kindergarten through eighth grade teachers and includes information, images and activities that can be tailored to your classroom curriculum.

BEFORE YOUR VISIT

This Teacher's Guide has been created to assist you before, during and after your visit to Cheekwood. Below are pre-visit discussion questions and garden guidelines to help prepare your students for their field trip. We encourage you to share this information with them prior to arriving for your tour.

WHAT IS IT?

Cheekwood is a 55-acre Botanical Garden and Museum of Art.
What is a Botanical Garden?
What clues on the property reveal that Cheekwood is a Botanical Garden?



HOW IS IT CARED FOR?

Cheekwood has 19 different plant collections including dogwoods, boxwoods, ferns and Japanese maples.
Who tends to Cheekwood's gardens and plant collections?
How is an outdoor plant collection cared for differently than a museum's collection of paintings?

WHY IS IT IMPORTANT?

Why is preserving green space important for our earth?
What other green spaces do we have in Nashville?
What can you do to help preserve our environment?

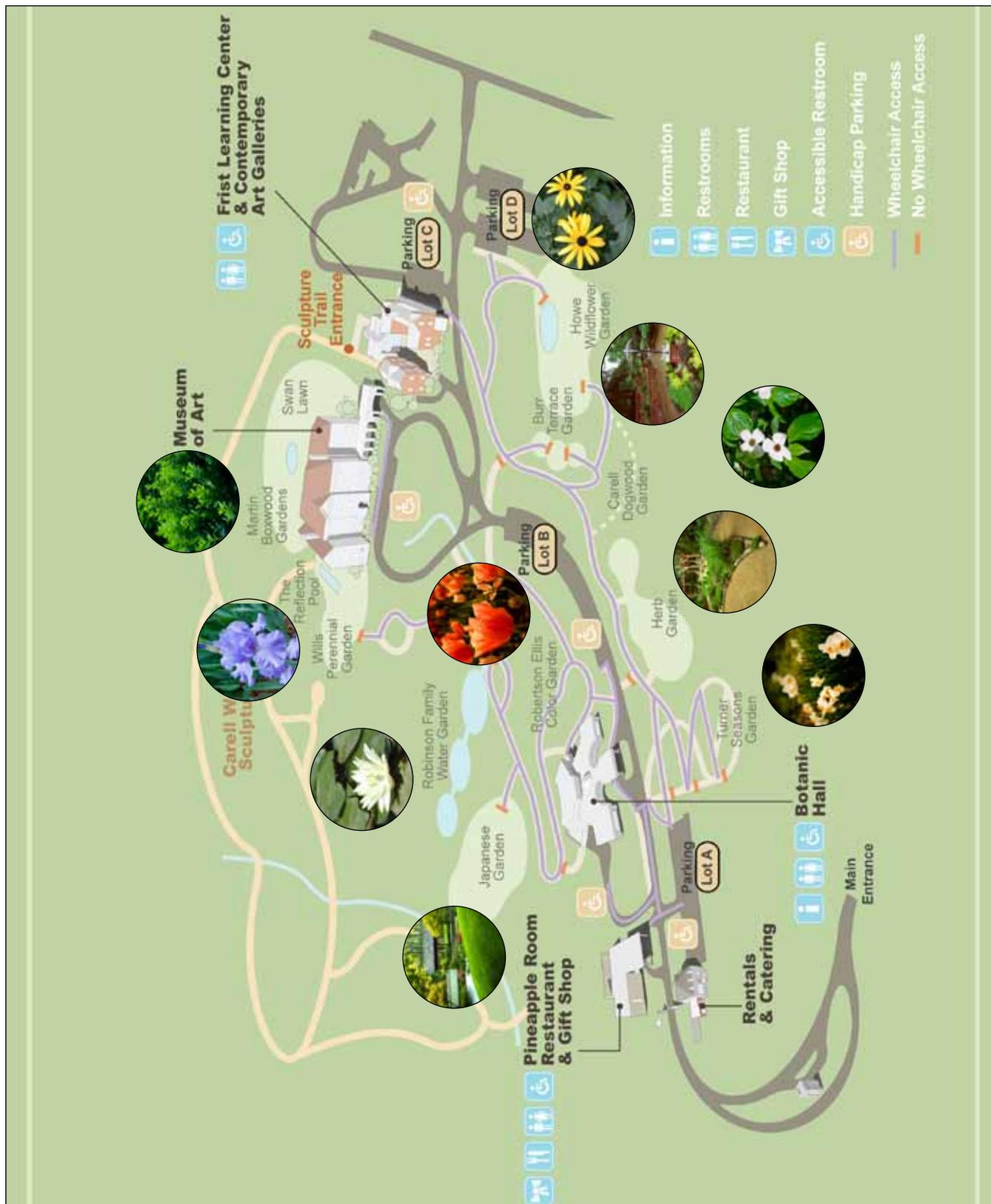


GARDEN GUIDELINES

- When walking through the gardens, please stay on the paths for your own safety and the protection of the plant collections.
- Please do not touch the plants or artwork.
- Many varieties of wildlife and insects make their homes at Cheekwood. Please do not disturb these valuable members of our ecosystem.
- Speak in a normal 'inside' voice. Please do not disturb other guests in the gardens or Museum by yelling or shouting to others. However, you may always ask questions of the Cheekwood staff, guides or docents.
- Stay with your group. Cheekwood is large, and it is easy to get distracted. We do not want anyone to get separated from their group.
- Students are welcome to take pictures in the gardens, but photography is not permitted in the Museum of Art.

GARDEN MAP

Cheekwood has ten gardens on the property. During your visit, students will have the opportunity to explore the gardens. Below is a map of where the gardens are located.

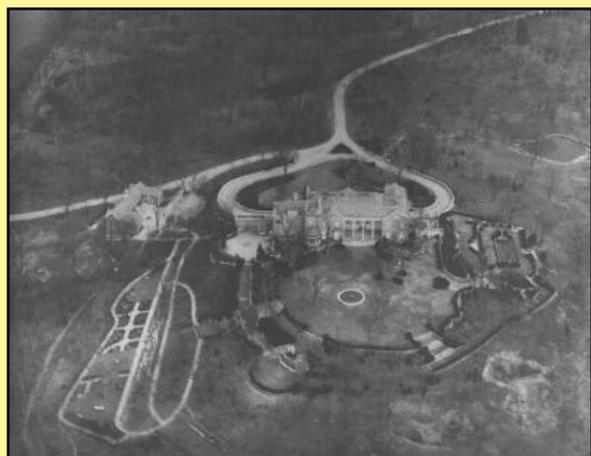


BOTANICAL BEGINNINGS

A BRIEF HISTORY of the BOTANIC GARDEN

The world's first botanic garden was established at the University of Pisa in Italy in 1543. Physics gardens were created for the academic study of medicinal plants. During the 16th century, medicinal gardens began to spread throughout Europe. The University of Oxford botanic garden was the first established in the United Kingdom in 1621 to promote education. Other gardens were being established throughout Europe with the mission of cultivating new species. During the 19th and 20th century, civic gardens were created in Europe. Most of these gardens were established as gardens for enjoyment, without scientific programs.

The Missouri Botanical Garden was the first botanic garden in the United States and was established in 1859. During this time, common garden activities included the careful labeling of collections and exchanging seeds with other institutions. Today there are over 1,700 botanical gardens and arboreta around the world.



CHEEKWOOD'S HISTORY

Cheekwood was originally a monumental country estate designed by leading landscape architect Bryant Fleming between 1929 and 1932 for the family of Mr. and Mrs. Leslie and Mabel Cheek. The family moved into the mansion at Thanksgiving in 1932. There were approximately 12-14 gardeners that tended to the grounds. Mr. Cheek was especially interested in the boxwood gardens. He collected hundreds of huge plants for the formal gardens, and had large holes blasted to plant the boxwoods in the limestone hill on which the house was built.

After Mabel Cheek's death in 1946 (Leslie Cheek died in 1935), the estate was passed on to their daughter, Huldah Cheek Sharp and her husband Walter Sharp. In 1959 the Sharps deeded the 55-acre estate for the creation of what now is Cheekwood Botanical Garden and Museum of Art.

GARDEN BASICS

A **garden** is a plot of soil where plants are grown. A **botanic garden** is a facility where trees, plants and flowers are chosen for scientific, educational, or horticultural value. It is a place where people can learn about plants, nature, and the environment.

WHO TAKES CARE OF A GARDEN?

A **gardener** is skillful in caring for a garden. Gardeners mow grass, pull weeds, trim trees and bushes, plant gardens and water plants.

A **horticulturist** is an expert in cultivating and improving the growth of plants.

A **botanist** is someone who specializes in the study of plants.

A **scientist** has advanced and extensive knowledge in the scientific field.

A **landscape architect** is a person who plans, directs and designs a landscape, garden or distinct space.

What do you SEE, SMELL and HEAR in the garden?



I SEE a tree...

As the seasons change, trees respond to the season. **Evergreens** keep their leaves throughout the year. **Deciduous** trees lose their leaves in the fall.

Visit the Turner Seasons Garden, and ask your students: *What season is it? Can you tell by looking at the trees and plants?*

I SMELL herbs...

Herbs are used for culinary and medicinal purposes. Herbs such as rosemary and thyme are used for cooking. These herbs can both be found in the Herb Garden.

While in the Herb Garden, ask your students: *Do you smell anything that reminds you of food you have eaten? What type of food?*



I HEAR an animal...

Many animals and insects such as squirrels, birds and bees make their home in the gardens. Bees are often buzzing around looking for flowers to pollinate.

As you walk through the Howe Wildflower Garden, ask your students: *Do you hear any animal sounds? What animal makes that sound?*

TREES, PLANTS, and FLOWERS

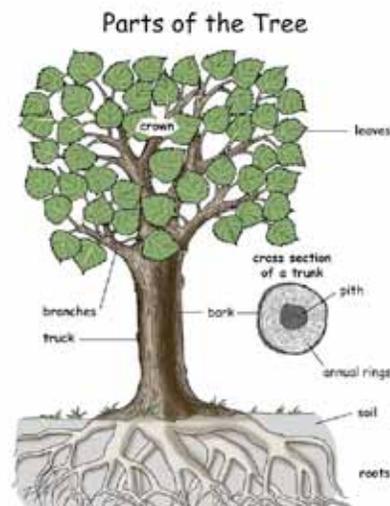
WHAT IS THE DIFFERENCE BETWEEN TREES AND PLANTS

Trees and plants are the same, trees are just bigger! They both have roots, a trunk, branches, and leaves. The tree's roots are needed to find nutrients and moisture in the ground to fuel the tree as it grows. The trunk and branches help the tree reach its' leaves to the sunlight to aid in photosynthesis. This also allows any flowers that are growing to be easily accessible to pollinators that might be flying around in the garden.

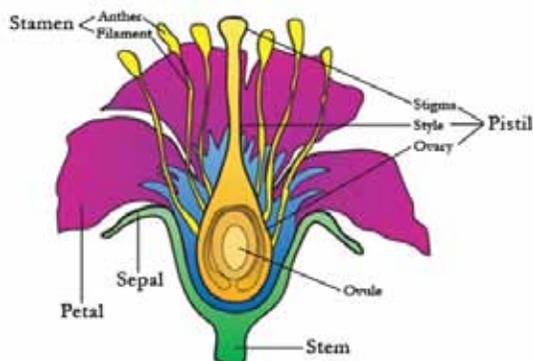
The flower contains all the reproductive parts of a plant, or the parts needed for pollination. Before a plant can produce seeds, it must be pollinated.

Pollination is the transfer of pollen from the anther to the ovules through the stigma. The pollen travels through the stigma and pollen tube to the ovules and fertilizes them. Then the ovary of the flower swells into a fruit that holds the developing seeds inside.

Once a flower is pollinated and begins to produce seeds, it is important that the seeds land in a spot where they have enough sunlight, space, water, and nutrients to grow. Some seeds are light enough to travel with the wind or in water, but many seeds travel with the help of animals. Some stick to an animal's fur, and others are collected by animals like squirrels who bury them. People are important seed movers too! For as long as people have been growing plants to eat, we have been collecting and planting seeds and spreading them all over the world.



PARTS OF A FLOWER



Anther – contains the pollen

Calyx – combination of all the sepals

Carpel/Pistil – female part of the flower, containing the stigma, style and ovary

Corolla – combination of all the petals

Filament – home of the anther and is the stalk of the stamen

Ovary – large base of the carpel bearing the ovule or ovules. This ovary matures to become a fruit

Ovule – found in the ovaries carries female gametes. Ovules later become seeds

Peduncle – the flower stalk

Petal – above and in the sepals, used to attract pollinators, are large and colorful

Pollen – young male gametophyte with a protective outer covering. Grains containing the male gametes

Receptacle – the part that contains the floral organs, located at the base of the flower

Sepal – leaf-like structures at flower base, protects flower bud

Stamen – contains the anther and filament, which are the male parts of the flower. Makes pollen grains

Stigma – receptive surface for pollen grains

Style – Between the stigma and the ovary where the pollen tube grows

TREES, PLANTS, and FLOWERS cont.

NATIVE vs. INVASIVE

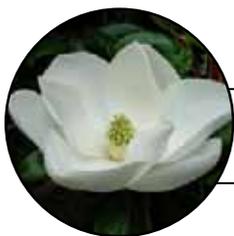
A **native** plant is one that naturally grows in a specific area and is best able to survive in that ecosystem. The White Ash *Fraxinus americana* is an example of a native tree that grows at Cheekwood. Can you find this tree in the Robertson Ellis Color Garden?



An **invasive** species is one that is not native to a habitat, and can be damaging to that ecosystem. An invasive species can negatively affect the economic, environmental, or ecological value of an area. These plants dominate the resources needed by other native plants and may interrupt the normal interactions between plants and animals in the area. The Japanese Shrub Honeysuckle is an example of an invasive plant that we are working to remove from Cheekwood. Can you find this plant on the Carell Woodland Sculpture Trail?

EVERY PLANT HAS ITS SEASON

Trees and plants change as the seasons change. The Turner Seasons Garden highlights plants that thrive during these different times of the year. Try to find the plants listed below in the garden!



SPRING

Redbud, Dogwoods, Fringe Trees and Magnolias



SUMMER

Stewardias, Golden Rain trees, Crocosmia and Daylilies



FALL

Japanese Maples, Heptacodium, Beautyberry and Sweetgum



WINTER

Birches, Cedars, Evergreens and Japanese Cedar

WHAT IS A PLANT LABEL ?

You will see labels on or near plants in the garden. These labels contain information about the identity of the plant.

BOTANICAL NAME

COMMON NAME

FAMILY NAME

ORIGIN



PHOTOSYNTHESIS

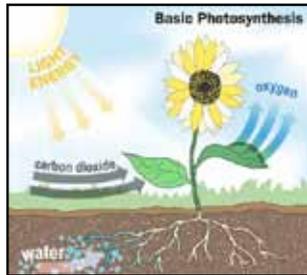
ASK YOUR STUDENTS

Why is photosynthesis important to animals and people?

Since sunlight is an important ingredient for photosynthesis to occur, what happens on cloudy days?

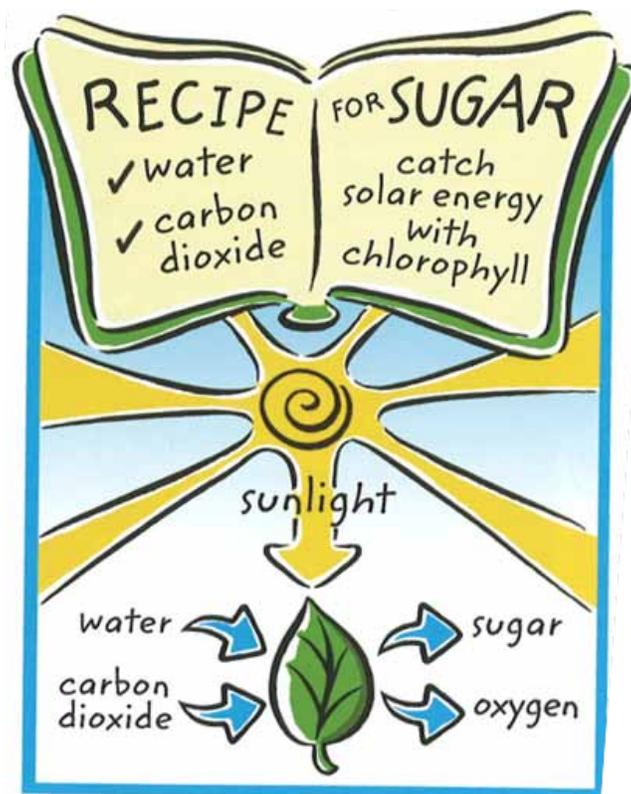
WHAT IS PHOTOSYNTHESIS ?

Photosynthesis is the process of feeding life on earth. Photo means “light” and synthesis means “to make.” Plants need sunlight to survive, and light is an important form of energy. To get their nutrients, plants combine two major ingredients - water and carbon dioxide. These two ingredients produce sugar, a high-energy product that is required for growth. Plants contain chlorophyll, a green pigment that traps sunlight energy. Every green part of a plant has chlorophyll, and therefore makes sugar.



Plants make another product during photosynthesis that almost all living things on earth require to live - oxygen. Most of the oxygen in the earth's atmosphere is made by green plants that grow on land and green algae that live in the oceans. When the sun rises, chlorophyll goes to work trapping light and using it to make sugar and release oxygen.

Light energy from the sun, shining down on the earth each day powers the sugar-making process which keeps plants alive and provides energy for most living things on our planet!



HABITATS, ECOSYSTEMS, BIOMES

What is the difference between a HABITAT, ECOSYSTEM and BIOME?

HABITAT

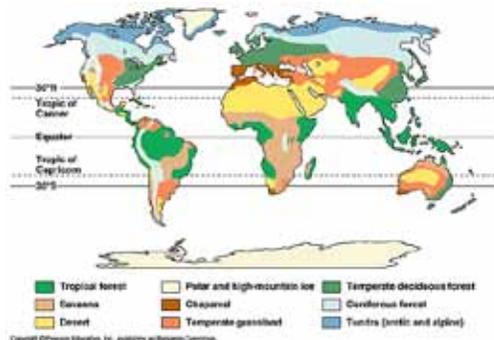
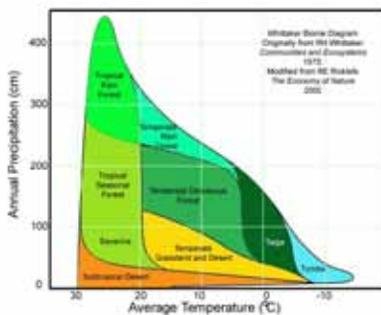
A **habitat** is the place where a population lives. A population is a group of living organisms of the same kind living in the same place at the same time. An example of a habitat is an ant colony or a pond at Cheekwood.

ECOSYSTEMS

An **ecosystem** is any group of living and nonliving things that interact with each other. Ecosystems can be as small as a puddle or as large as the earth itself. Within each ecosystem there are habitats that vary in size. An example of an ecosystem is a coral reef or an area of forest.

BIOME

Biomes are ecosystems where several habitats intersect. Biomes are determined by climate, temperature, substrate, ocean currents, and topography, among other factors. Each biome has its own climate, vegetation and animal life. Examples of biomes include desert, tundra, rainforest and grassland.



WHAT BIOME DO WE LIVE IN?

Tennessee is located in the temperate broadleaf deciduous forest biome. Temperate means that the environment has noticeable season changes. Other characteristics of this biome are consistent rain or snowfall during the year and rich fertile soil. A common tree found in this biome that you can also find here at Cheekwood is the dogwood tree. Dogwoods are deciduous trees and shrubs from the north temperate regions. Dogwoods are grown for their showy flowers, colorful bark and interesting, nearly horizontal, branching pattern. The flowers are small, usually yellow or yellow-green and may be surrounded by showy bracts that are white to dark pink.

ASK YOUR STUDENTS

What habitat do you live in?

How do plants change during the four seasons in Middle Tennessee?

Tennessee is located in the temperate broadleaf deciduous forest biome. What are the characteristics of this biome?

WATER CYCLE

ASK YOUR STUDENTS

Name some examples of how you see the Water Cycle in action?

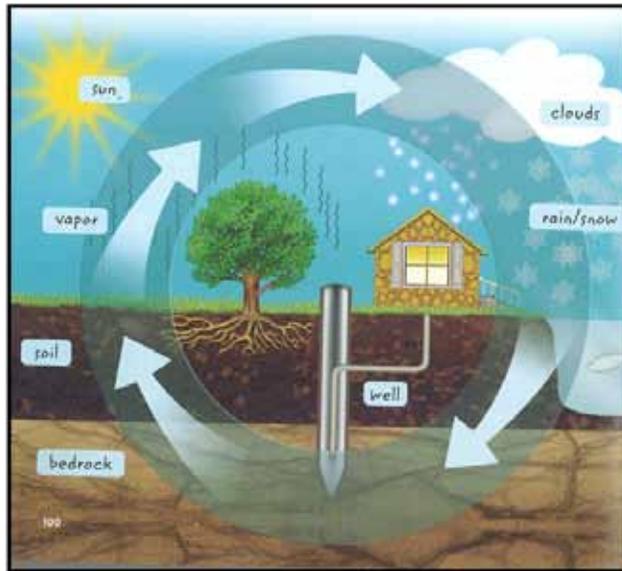
What is an example of evaporation?

Do you see precipitation on a daily basis?

WHY IS WATER IMPORTANT?

Water keeps every plant and animal in your neighborhood alive. Water allows plants in your garden to grow taller, flower, and produce fruits and seeds. Gardeners work hard to conserve the water that all living organisms require to survive because water is one resource that nature recycles. No water is ever added to what we already have here on earth.

HOW DO PLANTS GET WATER? (If we don't fill the watering can?)



Rain! Often times, plants get as much water as the amount of rain that falls. But where does that rain come from? The earth has a limited amount of water. That water keeps going around and around in what we call the **Water Cycle**.

The Water Cycle is made up of several main parts: evaporation and transpiration, condensation, precipitation, and collection.

● EVAPORATION and TRANSPIRATION

Evaporation takes place when the sun heats up water in rivers, lakes or the ocean and turns it into vapor or steam. The water vapor or steam rises from the river, lake or ocean and travels into the air. Transpiration is the process by which plants lose water out of their leaves. Transpiration gives evaporation a bit of a hand in getting the water vapor back up into the air.

● CONDENSATION

Water vapor in the air gets cold and changes back into liquid, forming clouds.

● PRECIPITATION

Precipitation occurs when so much water has condensed that the air cannot hold it anymore. The clouds get heavy and water falls back to the earth in the form of rain, hail, sleet or snow.

● COLLECTION

When water falls back to earth as precipitation, it may fall back in the oceans, lakes or rivers or it may end up on land. When it ends up on land, it will either soak into the earth and become part of the "ground water" that plants and animals use to drink or it may run over the soil and collect in the oceans, lakes or rivers where the cycle starts all over again.

VOCABULARY

Biome

Biomes are natural groupings of plants and animals that extend over a large region of the earth's surface. They are determined by climate, temperature, substrate, ocean currents, topography, and other factors.

Botanic garden

A botanic garden is a facility where trees, plants and flowers are chosen for scientific, educational, or horticultural value.

Botanist

A botanist is someone who specializes in the study of plants.

Chlorophyll

Chlorophyll is the green pigment (colored chemical) that plants use to trap sunlight energy in the process of photosynthesis.

Deciduous

A deciduous tree or shrub drops all its leaves around the same time once a year. They do this when it is dry and/or when the cold season starts. When moisture and warm temperatures return, new leaves grow again.

Ecosystem

An ecosystem is a community of plants, animals and smaller organisms that interact, live, feed and reproduce in the same environment.

Evergreen

Evergreen trees and shrubs keep their leaves during all seasons of the year.

Gardener

A gardener is a person who takes care of a garden by planting, mowing grass, pulling weeds, trimming trees and bushes, and watering plants.

Habitat

A place where living things find shelter, search for food and live.

Horticulturist

A horticulturist is an expert in cultivating and improving the growth of plants.

Landscape Architect

A person who plans, directs and designs a landscape, garden or distinct space.

Photosynthesis

Photosynthesis takes place in the green parts of every plant when chlorophyll traps the energy of sunlight. Sunlight is used to combine carbon dioxide and water to create sugar, an energy-rich substance plants use to grow and reproduce.

Pollination

Pollination occurs when pollen grains are moved from a flower's anther to the ovules through the stigma of the flower. Through pollination, plants are able to produce offspring by making seeds.

Water Cycle

The Water Cycle is the process in which water moves on our planet. Water takes many forms through these four stages: evaporation, transpiration, condensation, precipitation and collection.

CLASSROOM ACTIVITIES

SEED GERMINATION

SUPPLIES

Small dishes (plastic lids can work well)
Paper towels
Water
Seeds (use seeds that germinate quickly, such as: beans, sunflower or morning glory)



STEPS

1. Start the activity by having a conversation with your students about what seeds need to grow. Do they need sunlight, water and soil? Why do plants need these things?
2. Ask your students again if seeds really need soil. Ask them to explain why they believe seeds need soil or not. What happens if seeds do not get soil? To find out the answer to this question, you are going to do a science experiment. The experiment will take about a week.
3. Pair up the students in your class, and give each pair four dishes and eight seeds.
4. Have the students put a layer of paper towels on ONLY two of the dishes, then add a small amount of water to only these two dishes.
5. Now ask the students to place seeds in all four dishes. (Two dishes will have paper towel, water and seeds and two dishes will have only seeds.)
6. Place one dish with water and one dish without water in a refrigerator (or a cold place) and keep one dish with water and one dish without water in a warm place (a window ledge in the classroom works well).
7. Have the students observe the seeds through the week. What is happening? How do the seeds in water look different from the seeds without water? Did the temperature condition play a role in how or if the seeds grew?
8. Ask your students again, do seeds need soil to germinate?

This activity has been adapted from kidzpark.com.

CLASSROOM ACTIVITIES

BIOME IN A BAGGIE

SUPPLIES

Bottom half of two liter soda bottles, gallon-size resealable storage bags, pebbles, potting soil, bean or grass seeds, water

STEPS

1. Begin by giving each student a two-liter soda bottle (students can also do this project in small groups). Have them pour pebbles into the bottom half of the bottle, about a half an inch deep.
2. Have your students pour potting soil over the pebbles, twice as much soil as pebbles.
3. Then ask them to create a trench down the center of the soil about as deep as your fingernail.
4. Sprinkle a pinch of seeds in the trench. Cover the trench with soil.
5. Add water to the soil until you see water at the bottom of the pebbles.
6. Put the bottle in the storage bag. Seal it. Put it in a sunny place.

You have now created a biome! You won't need to water your seeds again because the water will recycle itself. The roots of the plant absorb the water and the water travels up the stem to all the parts of the plant. When the water gets to the leaves, some of it evaporates. Some water also evaporates from the soil. The evaporated water forms drops on the bag. This is called condensation. The condensation then falls back down to the ground, like rain. This is called precipitation.



CLASSROOM ACTIVITIES

COLORED FLOWERS

SUPPLIES

White flowers (carnations work great), food coloring, water, plastic container

STEPS



1. Start this activity by talking to your students about the importance of water for plants to grow and survive. This experiment will show your students that the water plants rely on reaches every part of their structure.
2. Have students divide up into small groups. Give each group the materials listed above.
3. Ask students to fill the plastic container with water and add about 10 drops of food coloring (it does not matter what color).
4. Cut a small piece of the stem off each flower. Place the flower in the container of food coloring and water.
5. Check on your flowers every few hours to see how the petals are changing color. After about a week, the flower will have turned from white to the color of the food coloring.

HOW AND WHY DOES THIS WORK?

The leaves and petals of plants have a lot of small holes called stomates. They are too small to see. Water evaporates through these holes, and this is called transpiration. After the water evaporates, the plant needs more water to grow. If the flower is planted in soil, the roots of the plant get water from the soil and then the water travels up through its stem. If the flower is in a container of water, it does not have any roots so it just sucks up the water through its stem.

When you see a flower that is an unnatural color, like a bright green carnation on St. Patrick's Day, you'll know how it was made. You can also dye a flower two different colors by splitting the stem in half and putting it in two different containers of colored water.

CLASSROOM ACTIVITIES

GLOBAL WARMING

SUPPLIES

Two empty jars, water

STEPS

1. Take two jars and put a teaspoon of water in each jar. Put a lid on just one jar.
2. Place both jars in a sunny spot.
3. After a few hours, check on the jars. You'll see that the open jar hasn't changed, but the closed jar will be steamy and hot inside. What happened? The heat from the sun could not escape from the closed jar.



WHAT CAUSES GLOBAL WARMING?

When we burn oil, coal or wood, we release carbon dioxide (CO₂) gas into the air. CO₂ slows down the movement of heat from the atmosphere. More CO₂ in our air is like putting the planet inside a tremendous closed jar. The earth gets more and more heat from the sun, but it can't cool off. It continues to get warmer.

When we plant trees, we create a place to store the carbon in CO₂. Trees take the carbon out of the air and store it. This is one reason why the rainforests are so important.

The Earth is bathed in light and other energy from the sun, not all of which is healthy. One kind of energy that is not good is called ultraviolet radiation (UV or UV-rays).

In the air and at the edge of space is a special kind of oxygen called ozone. Ozone is a fragile chemical, but it is just the right size and shape to absorb UV from the sun. The ozone layer is like huge sunglasses on the planet that filters UV rays. The ozone is being destroyed by chemicals called CFCs, which are used in refrigerators and spray cans. Spray cans in the United States no longer use CFCs.

CLASSROOM ACTIVITIES

PLANT PRESSING AND MOUNTING

SUPPLIES

Plants, newspaper or paper, pre-cut cardboard, large rubber bands, thick white paper, Elmer's glue, wax paper

STEPS

1. Have students collect a plant that is interesting in shape (make sure to tell them to get permission before picking the plant). You will just use the stem, leaves and flower.
2. Using a piece of newspaper that is larger than the plant, have students arrange the plant so the shape of the leaves and flowers will lay flat and not be crumpled.
3. Close the newspaper to cover the plant. Place the cardboard pieces on the top and bottom of the newspaper, with the plant inside of both layers.
4. Using rubber bands, wrap the paper and cardboard around the length and width. Have students write their name on the outside, along with the name of their plant specimen.
5. Place the pressed plant in a warm and dry place. Set a heavy book on top to keep it flat.
6. In one week, check on the plant pressing. If the plant is cool to the touch, then it needs to dry for a longer amount of time. If the plant is dry, then it is ready for mounting.
7. When the plant is ready, ask students to remove their dried specimen from the press. Once you chose what side of the plant looks best, it is time to mount it.
8. Add a small amount of glue to the pressed plant.
9. Carefully pick up the stem of the plant, turn it over and place it in the center of the white paper. Wipe off any extra glue.
10. Cover the plant with wax paper and put a heavy book on top of the plant.



Be sure to label the plant with its common name, scientific name and the location where you found it.

CURRICULUM CONNECTIONS

SCIENCE

Standard 1 – Cells

- Recognize that plants and animals are made up of smaller parts and use food, water, and air to survive.
- Use magnifiers to make observations of specific plant and body parts and describe their functions.

Standard 2 – Interdependence

- Investigate the habitats of different kinds of local plants and animals.
- Analyze the effects of changes in the environment on the stability of an ecosystem.
- Analyze the environments and the interdependence among organisms found in the world's major biomes.

Standard 3 – Flow of Matter and Energy

- Recognize that living things require water, food, and air.
- Identify the different life stages through which plants pass.
- Demonstrate how all living things rely on the process of photosynthesis to obtain energy.

Standard 4 – Heredity

- Observe how plants and animals change as they grow.
- Recognize the relationship between reproduction and the continuation of a species.

Standard 5 – Biodiversity and Change

- Describe how environmental changes caused the extinction of various plant and animal species.
- Describe the importance of maintaining the earth's biodiversity.

Standard 8 – The Atmosphere

- Recognize the major components of the water cycle.

LANGUAGE ARTS

Standard 1 – Language

- Demonstrate knowledge of strategies and resources to determine the definition, pronunciation, and usage of words and phrases.

Standard 2 – Communication

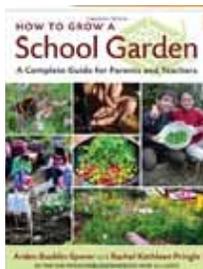
- Continue to develop listening skills necessary for communication.
- Continue to develop speaking skills necessary for communication.

Standard 5 – Logic

- Develop logic skills to enhance thoughtful reasoning and to facilitate learning.
- Use learned logic skills to make inferences and draw conclusions in a variety of oral and written contexts.

RESOURCES

BOOKS



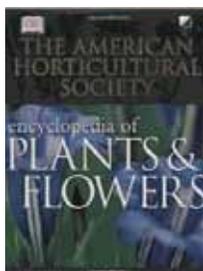
How to Grow a School Garden: A Complete Guide for Parents and Teachers
Arden Bucklin-Sporer and Rachel Pringle, 2010



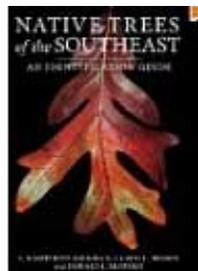
Kids in the Garden: Growing Plants for Food and Fun
Elizabeth McCorquodale, 2010



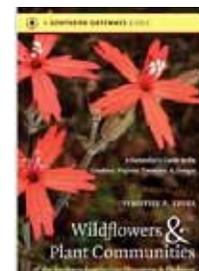
Kids' Garden: 40 Fun Indoor and Outdoor Activities and Games
Whitney Cohen and Roberta Arenson, 2010



The American Horticultural Society Encyclopedia of Plants and Flowers
Christopher Brickell, Trevor Cole and H. Marc Cathey, 2002



Native Trees of the Southeast: An Identification Guide
L. Katherine Kirkman, Donald J. Leopold and Claud L. Brown, 2007

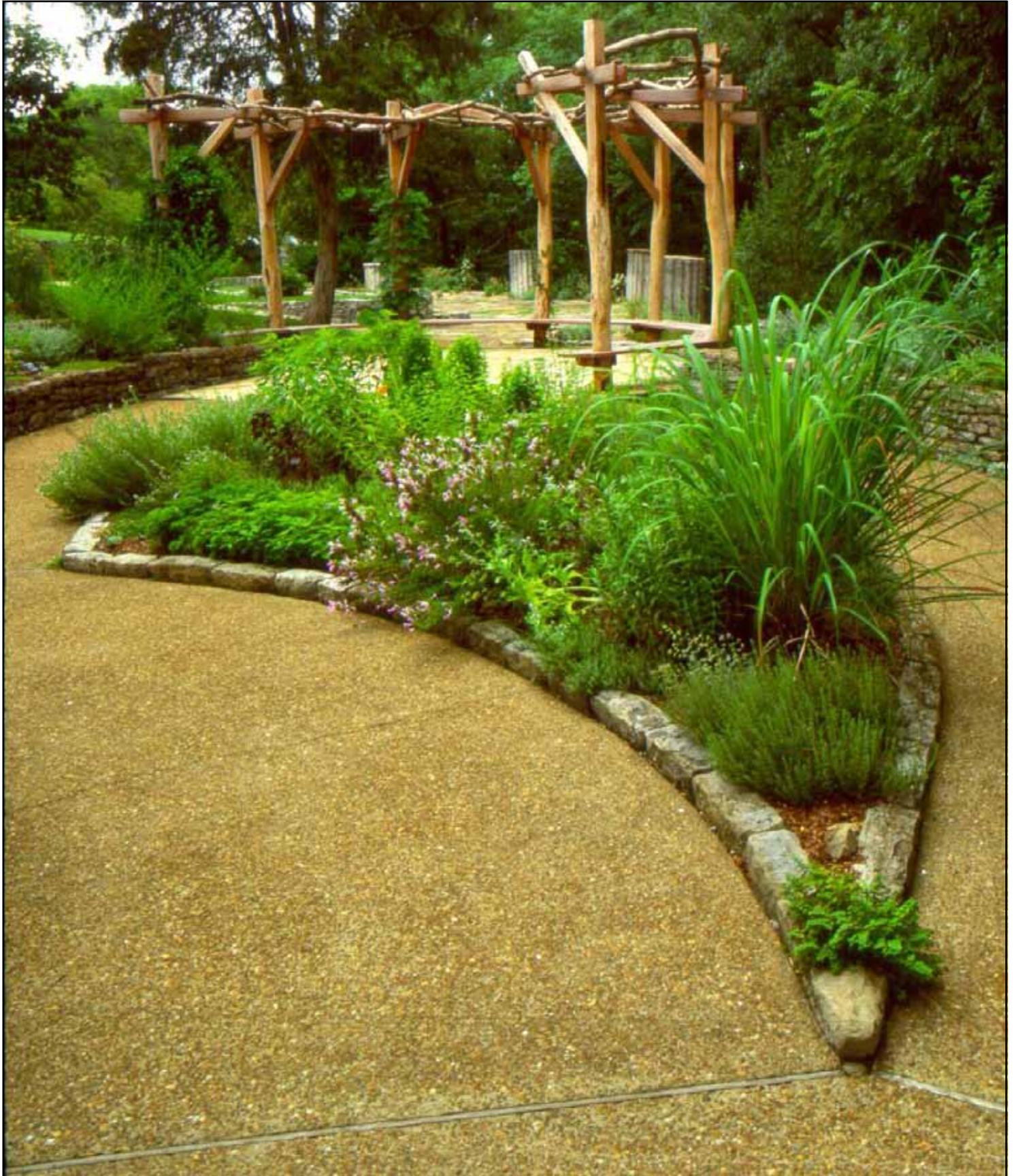


Wildflowers and Plant Communities of the Southern Appalachian Mountains and Piedmont: A Naturalist's Guide to the Carolinas, Virginia, Tennessee, and Georgia
Timothy Spira, 2011

WEBSITES

- **Cheekwood Botanical Garden & Museum of Art**
<http://www.cheekwood.org/>
- **National Gardening Association**
<http://www.garden.org/>
- **PBS Kids – Science Activities**
<http://pbskids.org/zoom/activities/sci/>
- **New York Botanical Garden**
<http://www.nybg.org/planthunters.php>
- **Kid's Gardening**
<http://www.kidsgardening.com/>
- **Chicago Botanic Garden**
<http://www.chicagobotanic.org/>

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