

Autumn Ramble

The Arboretum dazzles during this activity-based autumn tour!



Age: All

Time: 45+ minutes

Visit the gardens in the Arboretum and walk along the paths looking at leaves that have fallen and at trees and plants with leaves of many colors. You might want to wander in the Woodland Garden and the Legacy Garden. It is a stunning sight when leaves change from green to red, orange, and yellow, or a mixture of these colors. It's enough to make you want to do a happy dance and sing!



Evergreen trees

Deciduous trees

Look around to see colorful leaves on the trees and the ground. Not all trees lose their leaves; they are called evergreen trees. **Trees that lose their leaves at the end of their growing season are called deciduous trees.** Leaves fall from deciduous trees in autumn in temperate forests. The word deciduous is from the Latin word *decidere*, meaning "to fall off."

Leaves fall off trees when abscission cells cut the leaf away from the branch until it is finally pushed off and falls. **Abscission cells are inside the leaf where the leaf connects to the branch.**



Find a leaf that has fallen to the ground. Look up and see if you can figure out which tree it came from. Perhaps you can **match leaf** color and shape. Can you name the tree? Try to match another leaf with its tree.

Observe leaves as they fall from deciduous trees. How would you describe their trip to the ground? Do they spiral? Do they float back and forth? Do they glide from the tree to the ground? **Do a happy dance and pretend you are a leaf** falling from a branch!

Here's how:

- **Stand in the middle of the Meadow.**
- **Start on your tiptoes, walk around and around in a spiral** as you get lower, and finally land on the ground.
- **Start on your tiptoes, float left, then right, then left, then right** as you get lower, and finally land on the ground.
- **Start on your tiptoes, glide across the meadow** getting lower as you glide from one side of the Meadow to the other, and finally land on the ground.
- **With your friends pretend you are leaves falling to the ground: some spiral, some float left and right, and some glide to the ground.**
- **You might sing a song about leaves falling down, falling all around!**

Lack of sunlight makes leaves change color. The chemical chlorophyll is a pigment in leaves that makes leaves look green. Chlorophyll has a big job!



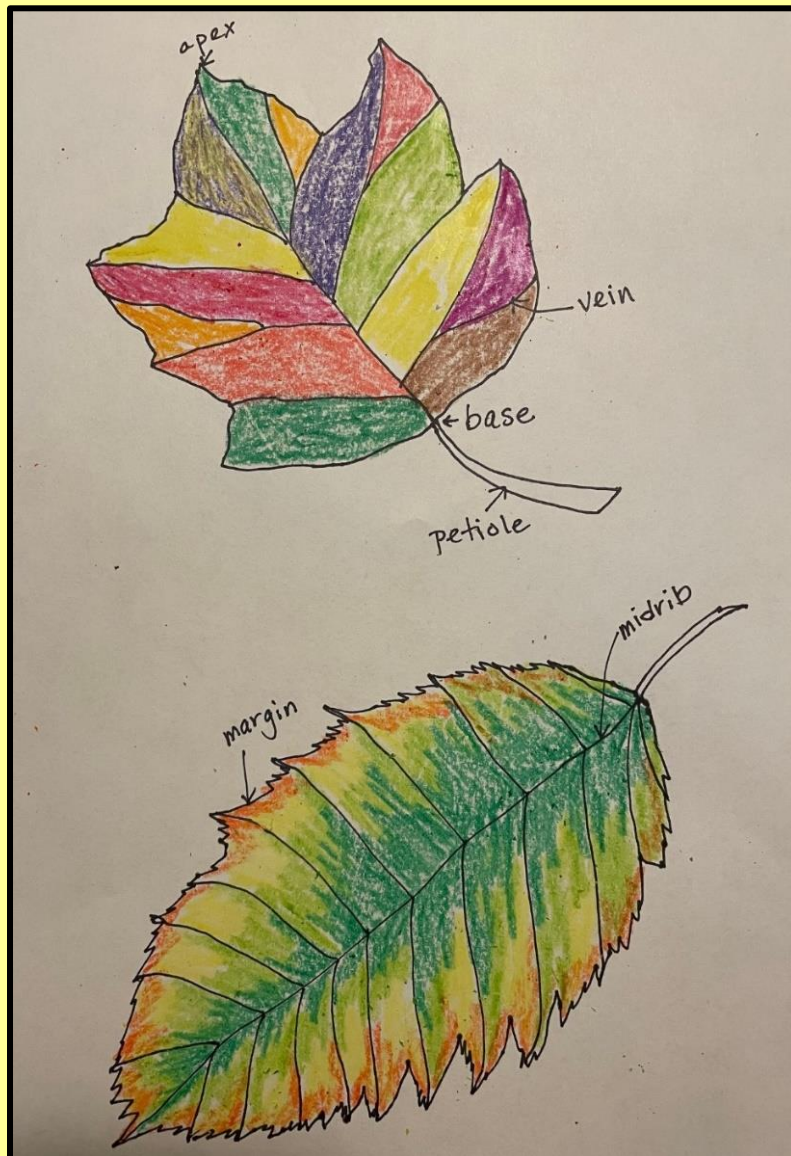
It absorbs sunlight to make food for the plant. With less sunlight in autumn, chlorophyll stops making food and breaks down. The green color fades away. Other pigments that make leaves look red, orange, and yellow now show up. These chemicals are named

anthocyanin (red pigment) and carotenoid (yellow pigment). They were in the leaves all along, but the chlorophyll covered them so we didn't see those colors. With the chlorophyll gone, we now see other pigments.

Find a leaf that is changing color. Observe the colors, edges, shape, and texture. Use paper and crayons or markers to color the leaf. Be creative!

Here's how:

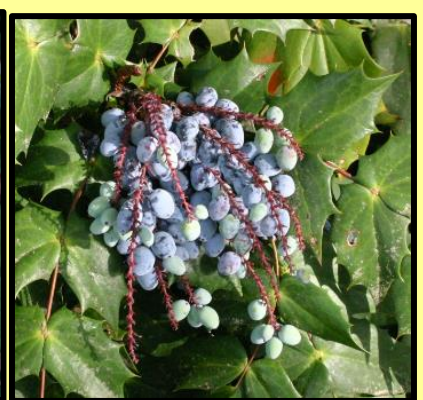
- **Draw the outline of a leaf that has fallen. Notice the edges (margins) of the leaf:** is it serrated (toothed) or is it smooth? **Fill the page with your drawing.**
- **Draw the midrib from the base of the leaf at the petiole to the end of the leaf (apex).**
- **Draw the veins of the leaf, making sure the vein lines extend from the midrib to the margin of the leaf. This will form segments to color as you wish.**
- **Choose autumn colors—red, orange, yellow, green, purple, and brown.** You can **color your leaf to match one you see or you can creatively mix up colors.**
- You can **choose colors that are not realistic to make an imaginary leaf.**



Seeds Everywhere!

When you look on the ground just about anywhere in the Arboretum, you will see seed cones. Look around again and you will see flowers that have dried up. Seeds are found in seed pods, seed cones, on dried up flower heads, and in fruit. Seeds are everywhere in autumn! That is because many plants make more plants (reproduce) by making seeds during spring and summer and releasing the seeds in the fall. Autumn is the perfect time to look for seeds in the Arboretum!

Here are some of the seeds, seed pods, and seed cones you may see on your Autumn Ramble:



Visit the **Children's Discovery Forest** for the following activities.

As you wander through the **Children's Discovery Forest**, you will see many seed cones on the ground. **Pick up a handful of seed cones.** Are the scales open or closed? Did you know that seed cones can help forecast the weather?



The scales of seed cones open and close depending on moisture in the air. When the air is dry, the scales of the seed cone open and the seeds are released. The wind carries the seeds far away. When rain is likely, the scales close and the seeds stay dry in the cone. If the scales opened while it was rainy, the seeds would get wet and be very heavy. They would drop too close to the mother tree and not have enough sunlight or food to grow.

Look on the ground for Maple Tree winged seeds (samaras). Some people call them helicopter seeds or whirly bird seeds because they whirl around like helicopter propellers when they fall from the tree. You might like to **use Maple Tree winged seeds to make nature craft projects.**

Here's how:



Dragonfly

- **Gather several samaras from the ground in the Children's Discovery Forest.**
- **Gather a few sticks, about 4 inches long, from the ground in the Children's Discovery Forest.**
- **Glue two samaras at the top end of the stick to make wings.**
- Using markers **color the samaras** beautiful dragonfly colors or leave them natural.



Animal Picture

- Gather several samaras from the ground in the Children's Discovery Forest.
- Draw insects or other animals on a piece of paper, leaving space for the samaras to be wings, legs, or arms. Try drawing bees, butterflies, birds, rabbits, or imaginary animals.
- Color your creation with markers.
- Glue the samaras into place.

Woodland Garden

Visit the Woodland Garden to observe fall colors and blossoms.



On your way to the Woodland Garden, be sure to observe the colorful leaves of two **trees in the Meadow**—the Sourwood Tree and the Ginkgo Tree.

In autumn, the oblong leaves of the **Sourwood Tree** (near the gazebo) are vivid red because of anthocyanin (red pigment). These leaves contrast with the stalks of late-blooming creamy white flowers. Bees collect nectar from these flowers; this nectar is used to produce delicious honey.



You will also want to see the bright yellow color of the fan-shaped leaves of the **Ginkgo Tree** up close! The ginkgo is standing by itself in the center of the Meadow. The carotenoid (yellow pigment) in the leaves is showing!



When you enter the **Woodland Garden**, notice that the **Japanese Maple trees provide a variety of leaf color, shapes, and textures**. Describe to your friend how viewing the Japanese Maple leaves and trees make you feel: happy, awed, colorful, thankful, quiet, bubbly...



Be sure to **look down as you wander the paths in the Woodland Garden**. The forest floor is teeming with **cyclamen**, which blooms in the fall. Look for plants with pink or white scented blooms on long stems that extend above the foliage. The green heart-shaped leaves often have silver marbling. Cyclamen is toxic to animals and people.



Legacy Garden

Walk east to the Legacy Garden to see two stand-out trees—the Japanese Stewartia and the Harlequin Glorybower.

The **Japanese Stewartia** is a deciduous tree with showy brilliant orange and red leaves in the fall. Just as showy is the peeling gray, orange, and reddish-brown bark on the trunk. The lovely white cup-like flowers of spring are now oval 1" seed pods that open to release small oval seeds. This is an all-around interesting autumn find!



The **Harlequin Glorybower** is a deciduous tree that features clusters of fragrant white starry flowers in late summer and early fall. In late autumn, the flowers give way to bright blue berries (seeds are inside the berries) set in star-shaped red calyces. The oval leaves remain green all growing season, which contrast with the flowers, berries, and calyces. An added attraction: the leaves smell like peanut butter! Some people call the Harlequin Glorybower the peanut butter tree for that reason.



Smith-Mossman Western Azalea Garden

Cross the main Arboretum path to enter the Smith-Mossman Garden. Ramble to the water feature where you will find benches to sit on and enjoy the autumnal view as you ponder your visit today.



Our Arboretum dazzles in autumn! Autumn is a time to celebrate beautiful colors now and hopes for future plants as seeds ripen and are released.

Which are your favorite autumn flowers and leaves and seed pods and seed cones? What activities did you try?



Thank you for coming to the Arboretum today!

The Back Story

Why leaves fall from trees

The scientific term for leaf loss is **abscission, which means "to cut away."** The word abscission may remind you of the word scissors, a tool that cuts. Leaves fall when trees cut way their leaves.

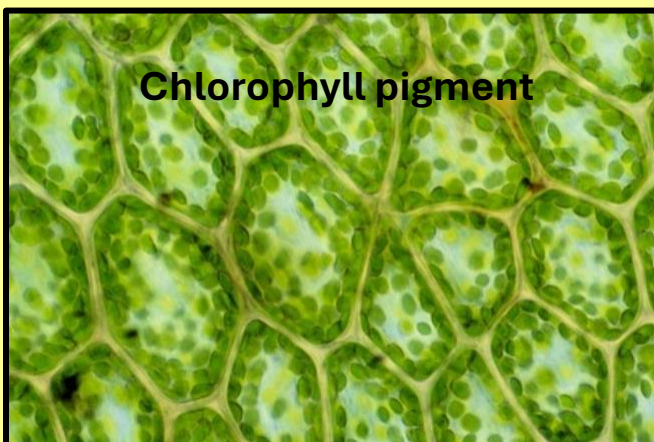


Here's how that happens. When the leaf stops making food, a chemical sends a message to leaves that it is time to go. Little cells (**abscission cells**) appear at the place where the leaf stem meets the branch (see the arrow). These **cells are like scissors and cut the leaf away** until the leaf is pushed off.

If deciduous trees kept their leaves during winter when it is freezing cold, the water in the leaves would freeze and the leaves would die. There would be no leaves to replace them, and the plant or tree would have no way to make food for itself when the sun started shining more the next spring and summer and it would die.

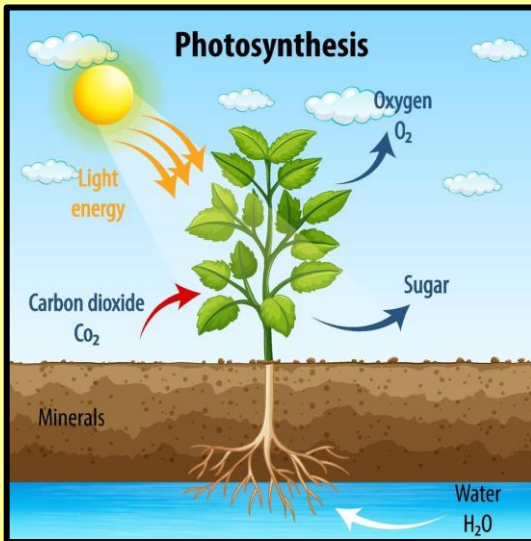
Why leaves change color

Let's talk about leaves to better understand why we see such vibrant colors in the fall.



Leaves have cells called chloroplasts that contain the chemical chlorophyll. Chlorophyll is a pigment that absorbs light energy from the sun and reflects the green wavelengths back to our eyes. That is why leaves look green to us.

Other pigments are also in chloroplasts. For example, red pigments (anthocyanin) and yellow pigments (carotenoid) are in leaves, but the chlorophyll covers them, so they don't reflect back to us and we don't see those colors.



Chlorophyll uses the light energy it absorbs to combine carbon dioxide (which enters the leaves from the atmosphere through small holes called stomata) and water (absorbed through roots and carried to the leaves) to make sugar and oxygen. The sugar is food for the plant and is carried throughout the plant in transport vessels. The oxygen is released to the atmosphere and we breathe it in. This process when plants make their food from sunlight, water, and carbon dioxide is called photosynthesis.

In autumn, the sun does not shine as much as it did during spring and summer. So, less light is available for the chlorophyll to absorb. Without energy from the sunlight, the chloroplasts make less and less food. The chlorophyll begins to break down, until there is no longer green pigment in the leaf. Green is no longer reflected back to us and the other pigments in the leaves begin to show other colors (orange, yellow, red) that were there all along but were covered up by chlorophyll.

When leaves no longer make food, the vessels no longer send water to the leaves. Instead, any food left in the leaves is carried to the trunk where it is stored to keep the tree healthy during winter. The leaf turns brown, dies, and falls. Some leaves fall before they turn brown.

Seed-making and release

Seed-making begins in the spring when insects, animals, wind, and water transport tiny pollen grains (gametes). Sometimes pollen is carried from one part to another part of the same flower, and sometimes pollen is carried to a plant far away. This is called pollination. Once it arrives, the pollen (gamete) joins with another part of the plant (ovule) to make a seed (zygote). This is called fertilization.

The seed that is formed has a tiny shoot and a root to help it grow, food for nourishment, and a seed coat to protect it. The seed continues to grow in its pod, fruit, cone, or flower head. Sometimes seeds change color as they mature.

When seeds are ready to be on their own, they are released. For example, in seed cones the scales open and the seeds that developed inside drop or blow away. Maybe one of those Douglas Fir tree winged seeds (samaras)

will develop into a new tree! Animals also help distribute seeds. For example, birds eat berries that contain seeds, and the seeds pass through their bodies and get pooped onto the ground. Maybe one of those berry seeds will grow into a new berry plant! Sometimes flower seeds may land on a river where they will be carried to a completely new place. Maybe next spring flowers will grow in that new place!

Plants usually produce many more seeds than will grow into new plants. For example, some seed cones contain more than 200 seeds. Whether seeds sprout and grow depends on conditions of soil, water, and air.