Finally Fall: Leave the Leaves!

Protect the beautiful life beneath your feet.

The idea of fall conjures much pleasantry in the imagination, especially for those of us here in the north eastern United States, where every year we are treated to the brilliance of our changing deciduous forests as the chill sets in and the natural world prepares to hunker down. The joy of this season feels very natural, it feels like this is a time when humans are more connected to the world in which we live, and more time than usual is spent admiring its vast beauty. What many of us do not realize is that there is a very important reason for leaves to fall, and that we have been inadvertently doing harm to our local environment while "cleaning up" the leaf litter in yards, parks, etc. The satisfyingly crunchy leaves that cover the ground are part of the intricate and delicate balance that sustains our lives on this planet, and they are a perfect example of the interconnectedness of all life that we humans must understand if we want to restore the health of our planet.

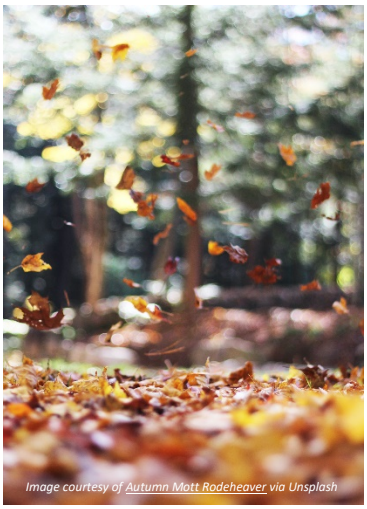


Image courtesy of Autumn Mott Rodeheaver via Unsplash

In an article written for Seattle University, Anne Schneider sums up these musings rather eloquently:

"As members of an ecosystem with a role and responsibility within the system, we must remember that because of our interconnectedness, *everything* we do has a powerful effect on our environment. In a city it is easy to think that nature is 'out there', but in reality our nature is right here…We live in a paradoxical position where we are yearning to connect with nature yet we are blind to the fact that we are already immersed *in* nature. We are a part of nature."

The basic fact is that Earth evolved to never waste anything, whether it be animal, plant, mineral, chemical, whatever! All organic and inorganic matter is part of a constant recycling system, and most of us are only vaguely aware of this process.

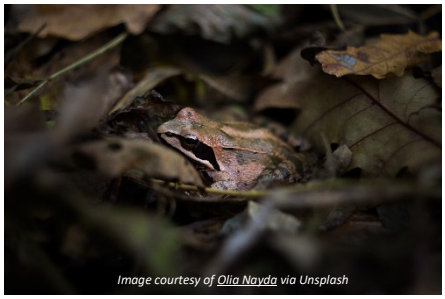
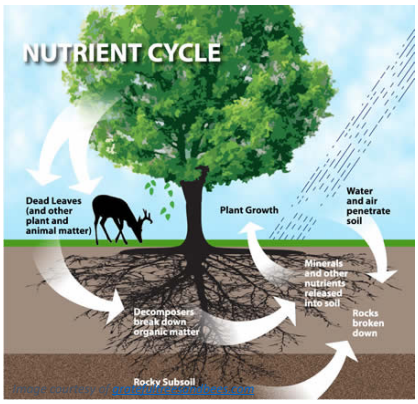


Image courtesy of Olia Nayda via Unsplash

A woodfFrog keeping cool and damp on the forest floor, among the fallen leaves.

Leaves are simultaneously part of living habitats for animals, active factors in climate control, and part of the nutrient cycle. When a plant, such as a tree or bush, produces leaves, it does so by using nutrients gathered from the soil in which it is growing, and when those leaves fall off the plant and onto the ground, they are simply returning those same nutrients back into the soil! The leaves are broken down by decomposers and detritivores, providing food for these animals and replenishing the soil's nitrogen, phosphorous, and carbon that the original plant needs to continue to live. Because decomposition takes time, these fallen leaves also provide shelter for a number of tiny animals and young, vulnerable plants that exist on and just below the ground level;



invertebrates such as slugs, ants, beetles, centipedes, etc. are all vital food sources for the rest of the food web and they rely on the leaves to protect them from drying out, heating up too much in the sun, being over-exposed to predators, and so many species even rely on leaf litter to act as a nursery for their offspring! The animals that eat these invertebrates, such as frogs, toads, and salamanders use this leafy habitat in the same way and are just as vulnerable. The young sprouts of our native plants need moisture to be trapped in the top layer of soil and kept cool in this layer of the forest floor as well!

Though you may not realize it, this directly impacts your life and it is important to understand the simple things you can do to help your local environments and thus yourself! You may feel far removed from the life of a moth's cocoon wrapped up in a dead leaf at your local park, but if that leaf is sent to a landfill, that is one less pollinator, one less piece of the food web, one less leaf to keep the ground cool and damp… the list goes on and on. You can absolutely maintain open green spaces in a way that is both aesthetically pleasing and hospitable to the tiny lives that are interconnected with ours.

Here at Duke Farms, our mission is to be an example of environmental stewardship, so we implement practices that display different methods of eco-friendly land management that community members can do at home, and leaf litter control is no exception! Of course every land owner should enjoy and be proud of their property, and no one wants to be unsafe in slippery leaf conditions, so it is important to understand the options when trying to become a part of the solution to climate change and habitat loss; at Duke Farms, we maintain a balance between wild native spaces and "manicured" recreational areas by simply mulching the fallen leaves with a mower! Instead of raking them into a pile and removing any chance of them replenishing the soil, we use a mower to finely chop them and then these tiny, barely noticeable pieces are then allowed to stay right where they are. Any areas of the property that are not used for direct recreational purposes by visitors can remain covered in full leaf litter, thus maintaining a healthy ecosystem right alongside these cleared areas.

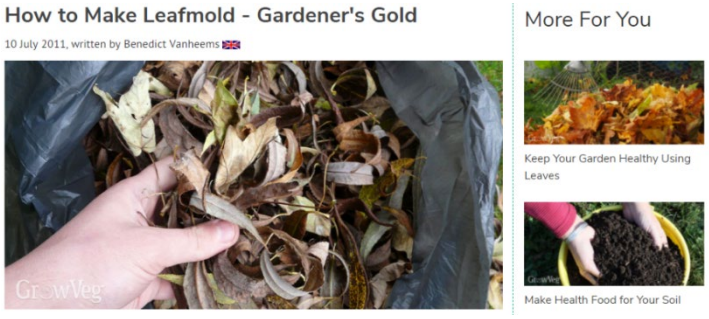
Autumn foliage at Duke Farms is mulched when needed and left to replenish the soil so it can continue the natural

This can easily be done by landowners; even if you choose to mulch all the leaves on your property, it is still much healthier than removing them. Depending on your interests, you can also explore composting any leaves that you don't want to leave alone or mulch (check out the series, An Experiment in At-Home Composting, written for the Distance Learning Portal by Sara DiVito!). Another option similar to composting is to create what is called **leafmould**,

which is essentially compost made of just leaves; this process takes longer, but is well worth the effort due to the resulting nutrient-packed substance that can be used to replenish soil and increase soil water retention! There are many great resources to learn more about how and why to create leafmould, and [this article is a short and sweet introduction.]

Image courtesy of Sevi Ariyo via Unsplash

In more urban spaces, it is encouraged to either rake leaves to any areas where there are plants (such around the base of trees planted in sidewalks or along small greenways) or ensure that the leaves that are removed from an area are sent for composting instead of to a landfill! Duke Farms participates in one such program, where we collect leaves from the surrounding communities and add them to the composting system on site that we use to perpetuate our healthy habitats!



What will you do to protect the tiniest of lives below your feet? The following resources will hopefully give you even more inspiration and methods with which you can create your own safe haven while the leaves come down!

Continue reading to find activities, experiments, and more fun resources to keep the learning going!

Activity: Minibeast Mania!

Objective: Participants of all ages will gain understanding of the concept of leaf litter biodiversity, learn to identify some common "minibeasts" (small fauna), and conduct a hands-on exploration to compare biodiversity in a variety of suggested habitats.

Materials:

- Attached printable "Minibeast identification key" (courtesy of Mr. Harper Penrose via spscience.wordpress.com) or other identification key if desired

- Large tray
- Small tray
- Gloves
- Trowel
- Magnifying glasses
- Forceps
- Measuring tape
- Rope or other material that can be used to mark edges of sampling area
- Pencil and paper

Background information: Biodiversity is the concept of living organisms from many different species all living together in a common area; a biodiverse system is healthier and stronger than one in which only a few species exist. Food webs are less likely to collapse when a given ecosystem is filled with diverse animals, plants, fungi, bacteria, etc. Leaf litter is a vital ecosystem that exists outside of much popular awareness, and it is important for the survival of many individual species, so diversity is obviously an important factor here as well. Many of the animals found in leaf litter are invertebrates, which means they have no backbone; some examples of common individuals are ants, termites, slugs, earthworms, beetles, caterpillars, etc. There are also microscopic organisms such as bacteria and fungi. Both the invertebrates and microscopic residents of this forest layer may play a role in decomposing and breaking down the fallen leaves, which contributes to the nutrient cycle that sustains the larger plants and animals in that area. There are also small vertebrates, such as frogs, toads, and salamanders, that can be found amongst fallen leaves; they feed upon the invertebrates in this habitat and rely on the leaves for protection from drying out and either being too hot or too cold. Human activity, especially when it comes to clearing away or disturbing leaf litter, leads to loss of habitat for these vital creatures, and can be dangerous for the local and global food web.

Keep an eye out for signs of dormant life, such as this: here a moth caterpillar has wrapped itself in a dead leaf to metamorphosize!

Procedure: Conduct this activity in leaf litter from a variety of locations and habitats, i.e. a residential yard, a public park, an urban environment, deciduous versus coniferous, etc. Begin by marking out a square area of any size between 1 ft sq. to 3 ft sq., then use the trowel or your hands or the trowel to scoop all the leaf litter and about the top inch of soil inside that area into the large tray. Use the forceps and/or your fingers to gently sort through the contents in search of any organisms living there, then carefully place whatever you find into the smaller tray for identification. Use whatever identification method you prefer to begin identifying and counting each individual; create a running list or tally chart to keep track and then release each individual after it has been counted! *When you have finished, be sure to return all the leaf litter and soil to the cleared area so as not to impact it for the future!* Repeat this activity in a variety of locations in order to gather data that you can compare and contrast!

Discussion: How biodiverse was each area? Did the data differ depending on the types of leaves present, the location, the time of day or temperature? What are some other factors that you think may

have affected the biodiversity of that sample? How would the data change depending on the time of year?

<u>Scroll to the next page where you will find the printable Minibeast Identification Key!</u>

Additional Activity: What's That Leaf?

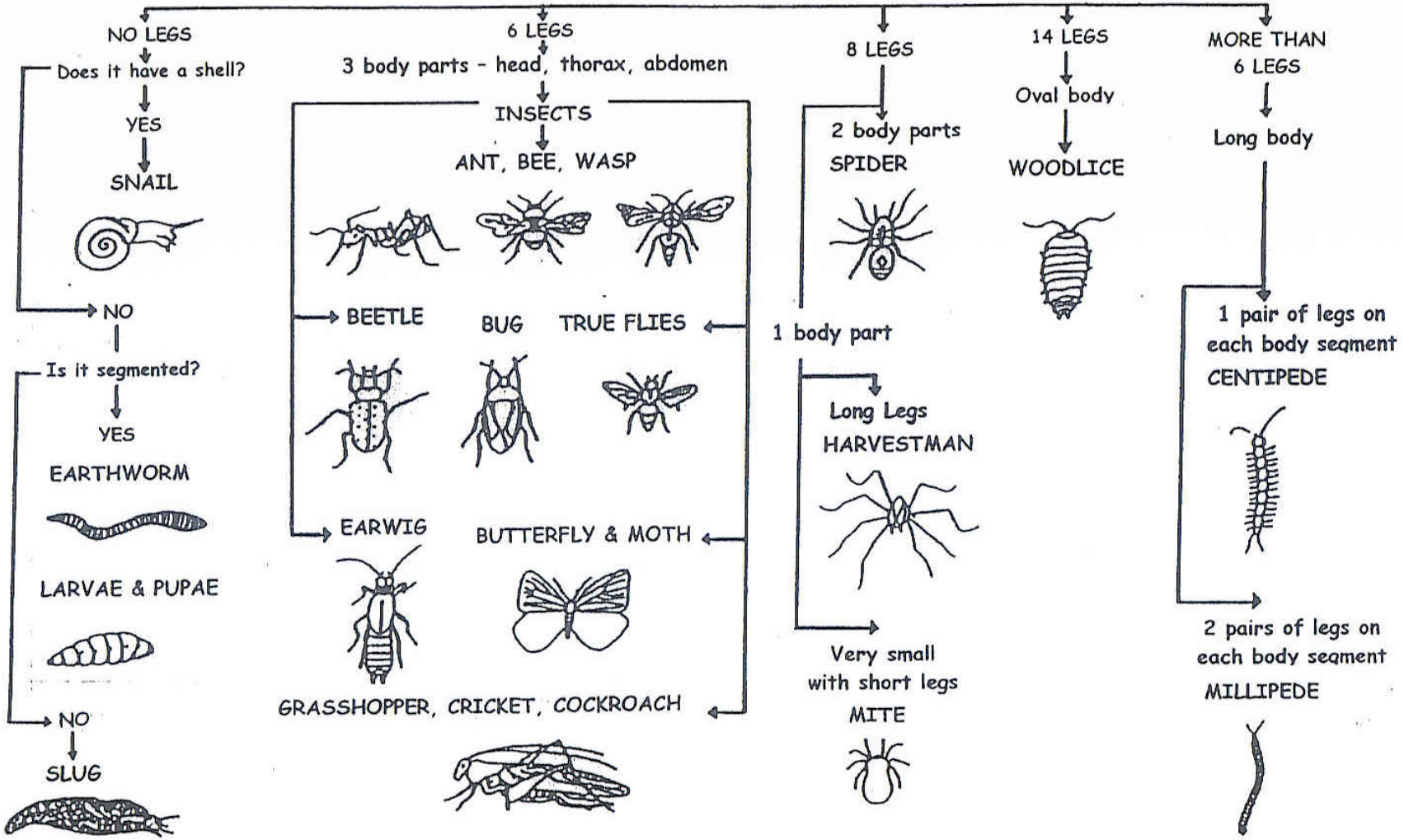
Identifying the type of leaves that you are sorting through on the ground may help you to better understand the specific habitat in which you are exploring! Identifying trees can take a while to get the hang of, but figuring out the type of leaf is a great way to start, so included in this packet is a helpful guide created by Duke Farms to introduce you to a simply method of tree identification for species found in the north east USA. You can visually match the leaves to the photos in the guide, and you can take a look at the trees above where you are sampling to help you! Here are some definitions of the terms found in the guide to get you started:

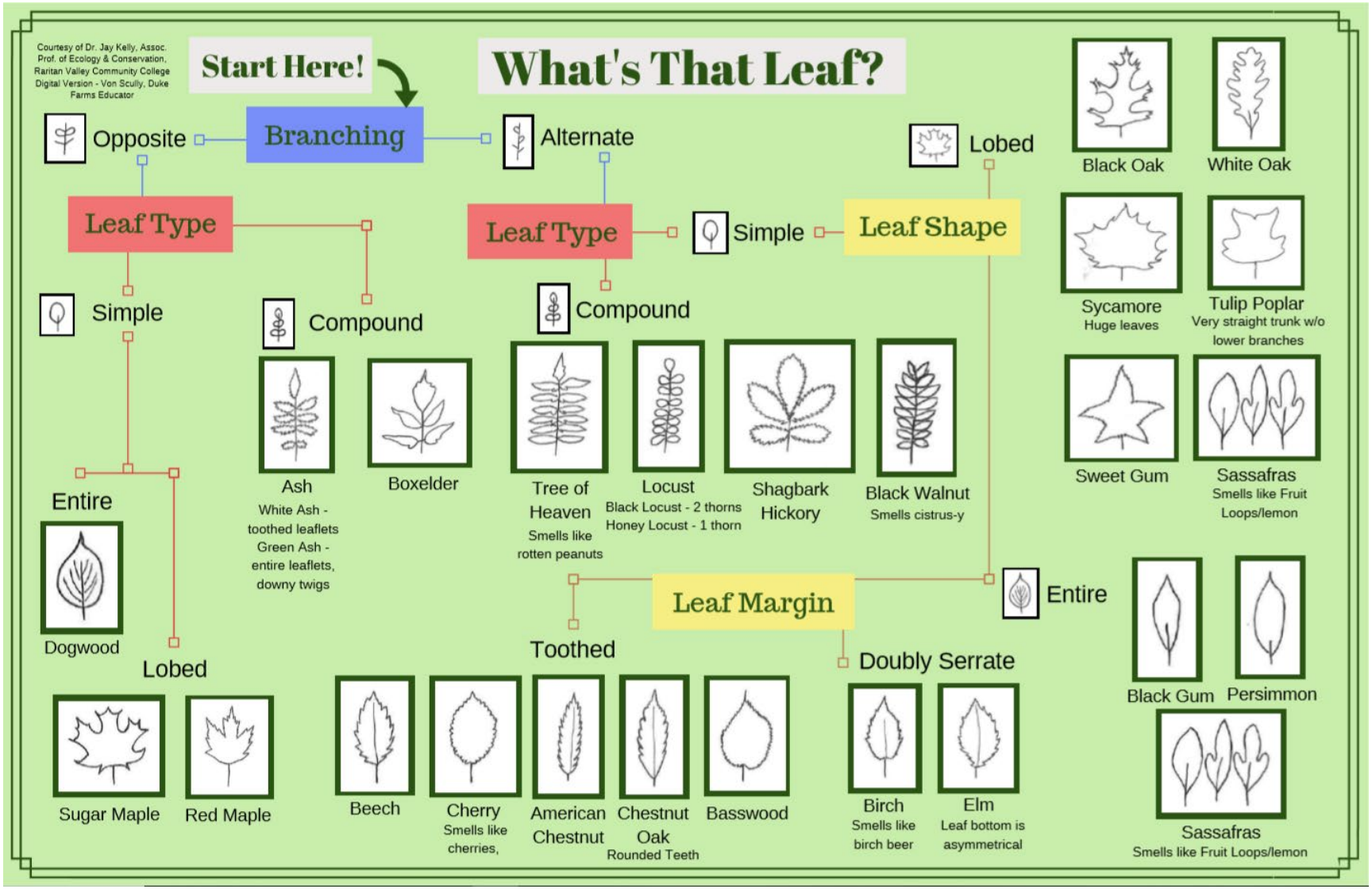
- **<u>Branching</u>** is simply how the branches of the tree are arranged, either ***opposite*** or ***alternate*** each other. Hint: in the north east, the only native species that have opposite branching can be grouped into the acronym MAD: maple, ash, and dogwood!
- **<u>Leaf Type</u>** breaks down into ***simple*** or ***compound.*** Simple leaves are a solid piece, while compound looks like many leaves on a branch, BUT is in fact a single leaf that is comprised of individual *leaflets*. If you want more help, check out this article from ThoughtCo. that goes into more detail on the difference!
- **<u>Leaf Shape</u>** separates into ***lobed*** or ***entire***, which can be simply understood with the question, "do the edges of the leaf cut in and make indents, or is it a continuous edge around the leaf?" If there are indents, those are the lobes! From there, you can look at the **<u>Leaf Margin</u>**, which can be ***toothed*** (serrated like a bread knife), ***entire*** (smooth), or ***doubly serrate*** (more complex serrated edge where there are large and small serrations).

Scroll to the next pages for the Minibeast Identification Key for the printable leaf key!

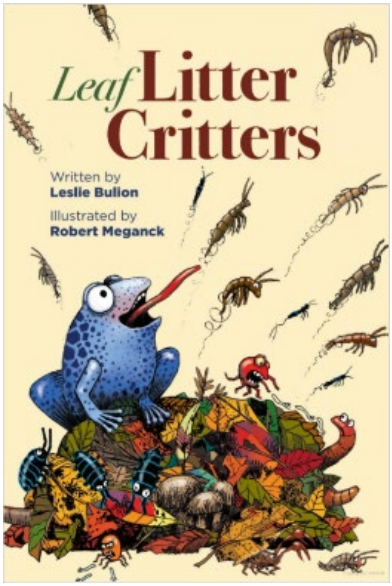
MINIBEAST KEY

How may legs does your MINIBEAST have?

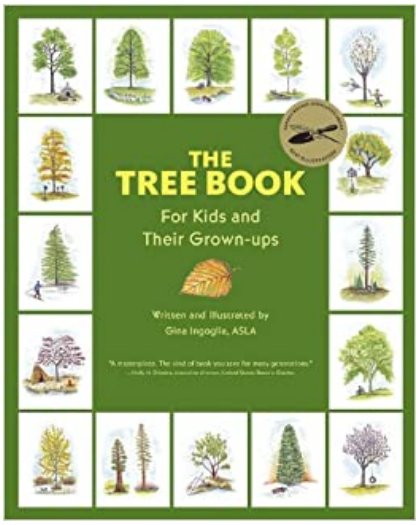



Courtesy of Dr. Jay Kelly, Assoc. Prof. of Ecology & Conservation, Raritan Valley Community College
Digital Version - Von Scully, Duke Farms Educator
Start Here!
What's That Leaf?
Branching
Opposite
Alternate
Leaf Type
Leaf Type
Simple
Leaf Shape
Lobed
Simple
Compound
Compound
Entire
Lobed
Dogwood
Ash
White Ash - toothed leaflets
Green Ash - entire leaflets, downy twigs
Boxelder
Tree of Heaven
Smells like rotten peanuts
Locust
Black Locust - 2 thorns
Honey Locust - 1 thorn
Shagbark Hickory
Black Walnut
Smells cistrus-y
Black Oak
White Oak
Sycamore
Huge leaves
Tulip Poplar
Very straight trunk w/o lower branches
Sweet Gum
Sassafras
Smells like Fruit Loops/lemon
Leaf Margin
Entire
Toothed
Doubly Serrate
Sugar Maple
Red Maple
Beech
Cherry
Smells like cherries,
American Chestnut
Chestnut Oak
Rounded Teeth
Basswood
Birch
Smells like birch beer
Elm
Leaf bottom is asymmetrical
Black Gum
Persimmon
Sassafras
Smells like Fruit Loops/lemon

Read All About It!



Leaf Litter Critters by Leslie Bulion is a gorgeously illustrated poetic journey through the usually overlooked layer of our earth, as explored through nineteen poems of a variety of verse forms. Laugh and learn with family or students while you dig down into these fascinating facts!



The Tree Book for Kids and Their Grown-Ups by Gina Ingoglia is a wonderful introduction to tree identification for children and is chock full of detailed and scientifically accurate artistic renderings that are sure to appeal to all ages! Easily approachable, it allows children to gather the information for themselves and then put it to use out in the field. It also includes many frequently asked questions about tree biology!