



# Great Trees

## Teacher Self-Guided Tour (SGT)

Grades 4-8



## Welcome!

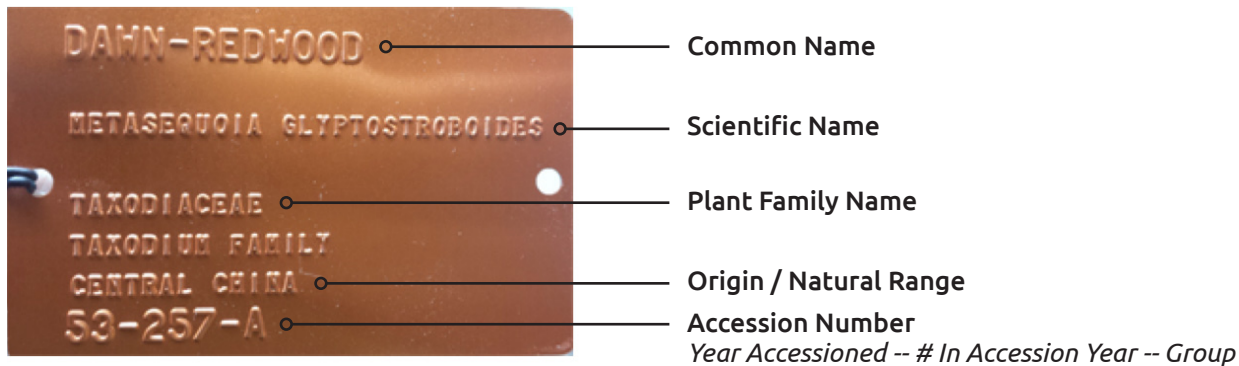
This tour is designed to offer suggestions and structure to your visit. You can go in any order, and please modify and add activities to fit the needs and interests of your class. If your students get excited about a plant, a piece of sculpture, or wildlife outside of the tour – go for it! The Morris Arboretum is a wonderful place with much to see and learn! Some of the activities are easier if written out. Have students bring something to take notes on.

## Garden Etiquette

- The most important rule is RESPECT – respect the trees and other plants, animals, and of course, people.
- Students are allowed off the paths, but they should not go into mulched areas. The mulch is there to protect delicate plants and root systems.
- Students MAY NOT climb trees. This damages the bark, limbs, leaves, and disturbs creatures living in the trees.
- Eat and drink only in designated lunch areas.
- There are bathrooms in the garden, noted on the map, as well as in the Visitor Center.
- Have fun and learn about the beauty and importance of trees in our environment.

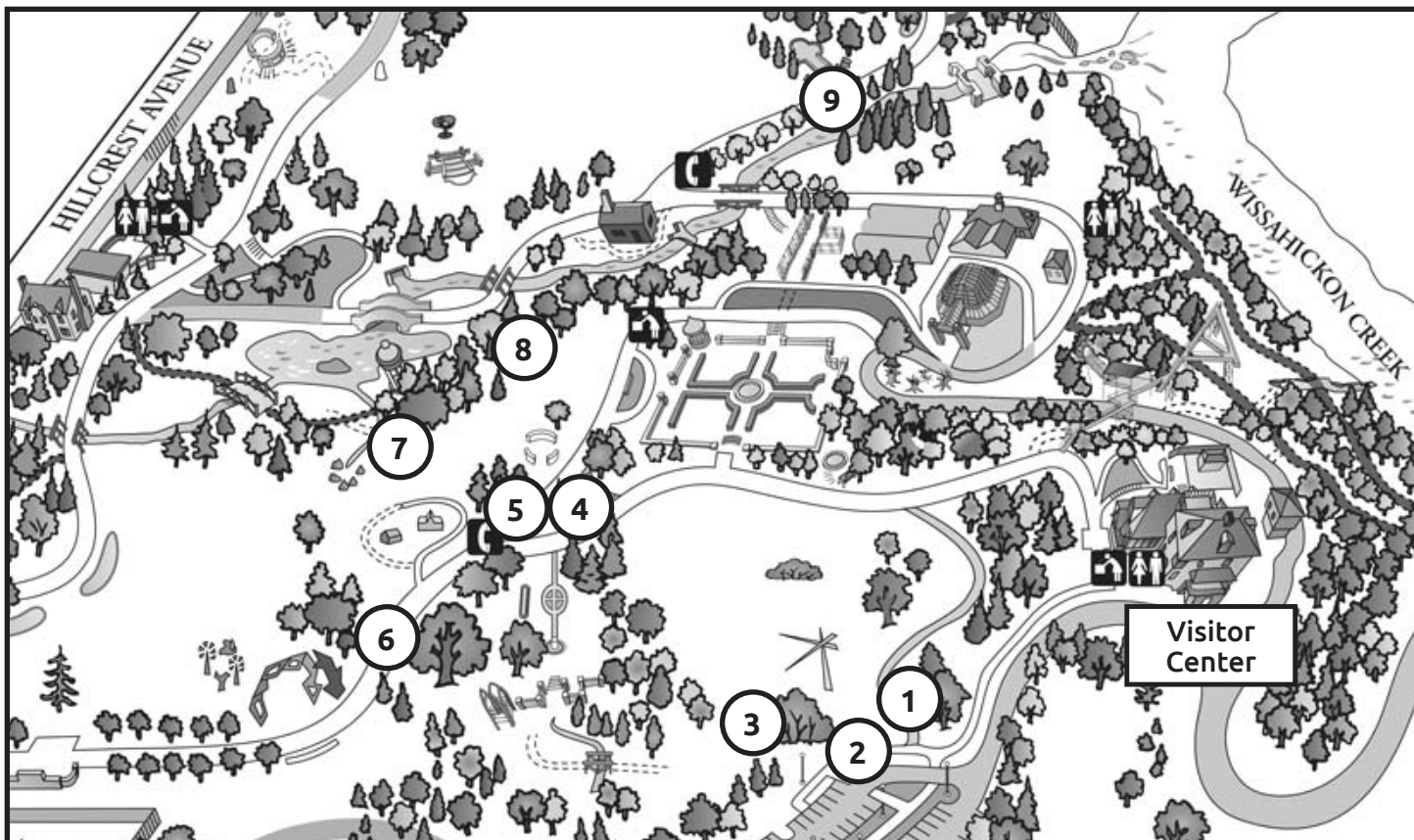
## Tree Identification

On many of the trees, there are copper identification tags embossed with the common name of tree, the scientific name of the tree, its place of origin, and the year it was accessioned (the year it was recorded into the collection – not necessarily the year it was planted.) Find one and show students how to read them. *Please DO NOT take these tags off the trees.*



## Words, phrases, concepts to know before taking this tour:

environment	habitat	deciduous vs evergreen	quarantine
photosynthesis	generation	hardiness	native vs exotic species
extinction	climate	pollination	invasive species
evolutionary change	broad leaf vs needles	Venn diagram	clone
habit	conifer	disease resistance	



## Tour Sights and Suggested Activities



### #1 Bender Oak (*Quercus x benderi*)

This is one of the oldest trees in the Arboretum, being around when George Washington was alive. George Washington was born on February 22, 1732.

- Have your students calculate how old the tree is.
- Have students think of other living things that live for more than 100 years. (giant sequoias in California; some olive trees in Israel and Greece, the California bristlecone pine trees can live for almost 5,000 years, giant Galapagos turtles, and giant whale sharks, people!)
- Notice the wire running up its trunk. Have students speculate on what this is for. (It is a lightning rod. This is a huge tree standing atop a hill – a perfect spot for lightning to strike. Check out the scar on the ginkgo tree, probably the result of a lightning strike.)



**Remember:** For the safety of our visitors and to preserve the structural integrity of our trees, climbing or sitting on the limbs of trees is not permitted. *Thank you!*



### #2 Ginkgo (*Ginkgo biloba*)

This type tree lived in North America during the Jurassic (Dinosaur) Period and then was believed to have gone extinct. However, it continued to live in China. Mr. John Morris planted this one in the early 1900's. Ginkgo trees can thrive in polluted areas. Remind your students that trees need carbon dioxide to make food and give off oxygen as a by-product of the process.

- How do ginkgoes help the environment? (Trees take in CO<sub>2</sub> from the air and release O<sub>2</sub>, provide shade, hold soil in place)
- There are male and female ginkgo trees. The females produce a large, soft-coated, strong smelling seed. Some people in Asian cultures consider the tree to be sacred and the seeds to be a delicacy. The seeds are extracted with a tweezer-like instrument and then roasted over an open flame. Ask students where they would plant ginkgoes?
- If leaves are on the ground, pick one up, feel the texture, draw the shape of the leaf. Compare its veins to those of leaves from other trees.



### Weeping European Beech (*Fagus sylvatica f. pendula*)

Horticulturists call the general growth form of a tree, its “habit.” This tree has a “weeping habit” because its branches point downward. As the branches of the weeping beech touch the ground, they take root. These can grow into new trees, which would be a clonal colony since they come from a single parent (asexual/vegetative reproduction).

- Ask students to explain the simile – downward branches are like weeping? (A person cries when they are sad, feeling down, often when we cry we look down, etc.)
- Create other similes using the habit of the tree as the motivator – The upright habit is as straight as a \_\_\_\_\_/or is as tall and slender as a \_\_\_\_\_



### Blue Atlas Cedar (*Cedrus atlantica 'Glauca'*)

This is one of the few trees in the Arboretum that originates in Africa. It comes from the Atlas Mountains in northern Morocco. The habit of this tree is “spreading.”

- Why can this African tree live in the Morris Arboretum? (Since it lives at a higher altitude in the mountains, the climate is cooler and damper than many other parts of Africa. It can tolerate the Philadelphia winters and rainy weather.)
- Have students draw the leaves and now look around the area for another kind of evergreen. Have students find out the name of this new tree by looking for the copper tag and write the name in their notebook. Draw the leaf/needle and compare to the blue Atlas cedar.
- Ask students why this tree is called “blue”? (Walk to the Garden Railway entrance, look at the golden Atlas cedar to your right then look at the blue Atlas cedar to your left. The color difference is subtle.)



### Edith Bogue Southern Magnolia (*Magnolia grandiflora 'Edith Bogue'*)

This plant is named for Edith Bogue, whose magnolia survived a harsh New Jersey winter. Normally, the southern magnolia cannot tolerate the cold of the Mid-Atlantic states. Researchers at the Arboretum are working on developing hardier magnolias that can tolerate cold. This tree is a broad-leafed evergreen.

- Ask students why scientists work to stretch the range of some plants? (Changing climate. Increasing food plant productivity.)

- Why is it important to have beautiful plants in the environment?
- Many plants are named after famous people. This is particularly true of roses: Mozart, Elvis Presley, Leeann Rimes, Laura Bush, Abraham Lincoln, John F. Kennedy, Amelia Earhart, William Shakespeare, Queen Elizabeth, and Pope John Paul II have had roses named after them. What famous person would students nominate to have a rose or another plant named after them? And why?



### Katsura-tree (*Cercidiphyllum japonicum*)

The Morris’s planted this tree in 1902. Its native range is Japan and China. In the fall, the leaves turn a golden yellow and the decaying leaves emit an odor like cotton candy. This is perhaps the largest katsura-tree in North America. Katsuras, like ginkgoes, have male and female trees. This tree is a male and there is a smaller female tree on another part of the property.

- Have students look at the shape of the leaves. What does it remind you of? (a heart, a triangle, etc.)
- How do the flowers of plants that are far apart get pollinated?
- Using the letters K-A-T-S-U-R-A, work in pairs to create phrases about this tree.  
K -- Kites would get caught in its wide branches  
A -- Awesome old age  
T -- Tremendous width  
S -- Smells sweet sometimes  
U -- Under the tree is cool  
R -- Rough bark  
A -- Asian origin



### Lacebark Pine (*Pinus bungeana*)

This tree is also native to China, like the katsura. This tree has exfoliating bark, which means that the tree naturally sheds its bark (or you say its bark peels away). Even though it is inviting, **please ensure students do not peel the bark off the tree.** This will hurt the tree.

- Have students describe the colors of the bark in their notebooks.

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- Then have them go to a nearby tree. Have students find the copper identification tag and write the name of the tree in their notebooks. Have them describe the bark of that tree in the notebook.
- Working in pairs, have students create a Venn Diagram, noting differences and similarities.



## #8 Chinese Elm (*Ulmus parvifolia*)

This is another tree that is native to China, like the lacebark pine and the katsura. This specimen is one of the largest Chinese elms in Pennsylvania. It is an important tree because it is resistant to Dutch elm disease, a fungus that is spread by elm bark beetles.

In the 1800's and 1900's, people planted elm trees along the city streets for their beauty and shade. In 1967, a deadly strain of the fungus came to the US from Great Britain. The disease spread through the country, killing millions of these beautiful trees. Scientists have spent decades developing a Dutch elm disease-resistant American elm by breeding them with Chinese elms. However, the scientists have found that Chinese elms thrive in our environment and have become invasive in many places.

- Ask students if introducing the Chinese elm a positive or negative action.
- Ask students what was learned from this story? (Planting many kinds of trees instead of just one reduces the loss if a disease strikes. We won't lose all the trees – and their benefits of shade, soil retention, flood control, putting out oxygen and taking in carbon dioxide.)
- The US Customs Service has strict laws about importing plants into the country, so dangerous fungi, insects, and bacteria do not enter the country. Importers need special permission to bring in plants, and the plants are quarantined to insure they harbor no dangerous organism.



## #9 Dawn Redwood (*Metasequoia glyptostroboides*)

This is a deciduous conifer, related to the giant redwoods in California. Although this genus (*Metasequoia*) lived in North America during the Upper Cretaceous Period, they died out. Scientists assumed they were extinct until a botanist found a grove of the trees on a mountain side in China in 1941. Seeds were collected and the Arboretum received some in 1947 for planting. The trees from these original seeds can be found beyond the Rose Garden and to the right of the Swan Pond.

- Are there other plants living today that also lived during the Age of Dinosaurs? (ferns, ginkgoes, etc.)
- Deciduous conifers lose their needles (are not evergreen). There are 3 types of deciduous conifers at the Arboretum; larch and bald cypress are the other two. Find the bald cypress beside the Swan Pond.

## Challenge Questions

Back in the classroom, students can continue to research and think about these questions.

- Dutch elm disease decimated American elm trees all over the US. Presently the wooly adelgid is destroying Canada hemlocks in the Northeastern part of the country. What is a wooly adelgid? How does it destroy trees? What are scientists doing to save the trees?
- What is an invasive species? What are natural predator cycles and how could this cycle be disturbed by invasive species?
- Cooks are now harvesting invasive species for food. Research one invasive plant and one invasive animal currently being served in restaurants.
- What are the characteristics of deciduous and evergreens trees? How might a tree benefit from not having all its leaves drop at the same time. Name a deciduous broad-leafed tree, an evergreen broad-leafed tree, an evergreen conifer and a deciduous conifer.
- Investigate the laws governing what plants and animals are allowed into the US from other countries. How successful is the USDA-APHIS in keeping out harmful pathogens, insects, etc.?
- Investigate photosynthesis. How efficient is photosynthesis? Can plants store the energy produced in the process? Consider what life on earth might be like if plants were more efficient in capturing light energy to produce more tissue.
- Investigate bioengineering: how scientists utilize aspects of plants to make products for daily use.
- Research plant life during the Jurassic or Cretaceous Period.
- Where are the Atlas Mountains and what other plants and animals live there?