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“Your Guide to Tree Adventure”: Interpretive Panel and Guidebook Design

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An independent study project report by The McLean Contributionship Endowed Education Intern (2018-2019)

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“Your Guide to Tree Adventure”: Interpretive Panel and Guidebook Design

Abstract

In honor of Out-on-a-Limb’s 10th anniversary, this project provides supplementary interpretation at the Arboretum about tree morphology. In addition to creating an activity booklet designed to encourage visitors with children to see different corners of the Arboretum, I also created three interpretive panels intended to walk a visitor through the parts of a tree. These panels are titled “Don’t leave without looking,” “Every ring tells a story,” and “Getting to the root of things.”

Disciplines

Horticulture | Instructional Media Design

Comments

An independent study project report by The McLean Contributionship Endowed Education Intern (2018-2019)

Title: “Your Guide to Tree Adventure”: Interpretive Panel and Guidebook Design

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Date: April 2019

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INTRODUCTION: BACKGROUND, PURPOSE AND GOALS

The Morris Arboretum's most ambitious installation, Out-on-a-Limb, is more than a space for play. Paired with 18 interpretive Tree Adventure panels, Out-on-a-Limb offer's the visitor an immersive educational experience "connecting us to the natural world, and themed to teach us that *we need trees and trees need us.*"¹

In 2009, the first iteration of the Tree Adventure passport debuted. Designed to act as an accompaniment to the Tree Adventure Exhibit, the Tree Adventure Passport offered an incentive for visitors to move beyond what they already knew at the Arboretum, as well as providing visitors with additional information about tree function and their role in the environment. The passport, a brochure-sized booklet complete with activities, worked with stamping stations, mechanical presses that visitors could use to emboss their passport. After eight years, however, the stamping stations were beginning to show signs of wear and tear and were removed in 2017.

In honor of Out-on-a-Limb's 10th anniversary in 2019, the Arboretum will reintroduce the concept of the stamping station and Tree Adventure passport. To avoid mechanical failure in the future, instead of reintroducing the embossing stamping station, the next passport is designed to work with drawings laser etched into the interpretive panel that visitors can use to make rubbings.

This project focuses on the process of designing three new interpretive panels with rubbing stations and a tri-fold brochure designed for children, titled "Your Guide to Tree Adventure."

METHODS

According to the National Science Education Learning Standards, "making observations is key to inquiry-based and discovery-focused learning."² The educational goal of this project is to help students become better observers by giving them the language to describe what they see.

In accordance with best museum practices, I began this project by first asking what the visitor needs.³ When developing an overall theme for the project, I wanted to understand the types of questions visitors ask when they come to the Arboretum. After talking to guides and school groups, I realized that many visitors could benefit from an expanded plant vocabulary.

In the early stages of designing, I was particularly struck by an experience a guide had with a group of elementary aged students. A young student who had been to the Arboretum before began their tour insistent on showing their classmates "the tree that looks like a leopard on the top and a cheetah on the bottom." As it turns out, this student was referring to the grafted

¹ Morris Arboretum, *Out on a Limb*, <http://www.morrisarboretum.org/outonalimb.shtml>.

² The Sourcebook for Teaching Science, National Science Education Standards, <https://www.csun.edu/science/ref/curriculum/reforms/nse/>.

³ Beverly Serrel, *Exhibit Labels: An Interpretive Approach*, Rowman & Littlefield, 2015.

tabletop scotch elm. I found this description fascinating because the student had clearly used their observation skills and made a description using the language they had access to, but that description was not immediately accessible to the guide. Once the guide and the student knew they were talking about the same phenomena, they were able to have a more meaningful conversation. In a similar vein, I am someone without a tremendous background in plant science but after taking a course in plant biology, simply learning the vocabulary botanists use to describe plant morphology has made me a much better plant observer. I've now noticed myself pointing out features I never before new existed, much less knew the name for. It was this process that made clear for me that the panels should be about form, more so than function.

Another goal of this of this project was to ensure that visitors of all ages could have meaningful engagement with the material.⁴ In designing the panels, it was important to use accessible vocabulary and provide phonetics for larger words. In addition, every panel has a “rubbing station” to engage even the youngest of hands. Finally, the panels and passports are designed to encourage multiple levels of engagement and accommodate the multi-generational family. The activity booklet has simple language (because most often we see the children taking charge of the passbook), while the signs have slightly more advanced language.

Finally, I evaluated the Arboretum as a space. One of my immediate observations was that in order for visitors to use existing navigation panels, a visitor needs to get to the Rose Garden before any navigation sign points them to the Oak Allée. Unlike previous versions of Tree Adventure tours, I chose to add a panel by the Rose Garden to reduce navigation confusion. I also wanted to focus on accessibility during this tour. The panels have been designed to accommodate red-green color blindness and all panels are placed on ADA/stroller accessible paths.

⁴ From Museum Council Event (11-7-18), Judy Koke.

RESULTS

Panels

I researched, wrote and designed three new interpretive panels entitled “Don’t leave without looking,” “Every ring tells a story,” and “Get to the root of things,” about leaves, tree rings and roots, respectively. I chose these topics to simulate a visitor’s experience of walking through the layers of a tree, moving from the canopy, to the trunk and finally to the roots.

Based on information about how most visitors travel through the Arboretum, visitors start on Out-on-a-Limb.⁵ Out-on-a-Limb puts a visitor 50 feet above the ground, nestled among the canopy. For this reason it seemed like a natural choice to focus on leaves at this location. The first panel is called “Don’t leave without looking.” This panel is all about the language of leaf shape, highlighting entire, lobed and toothed margins as well as pinnately and palmately compound arrangements.

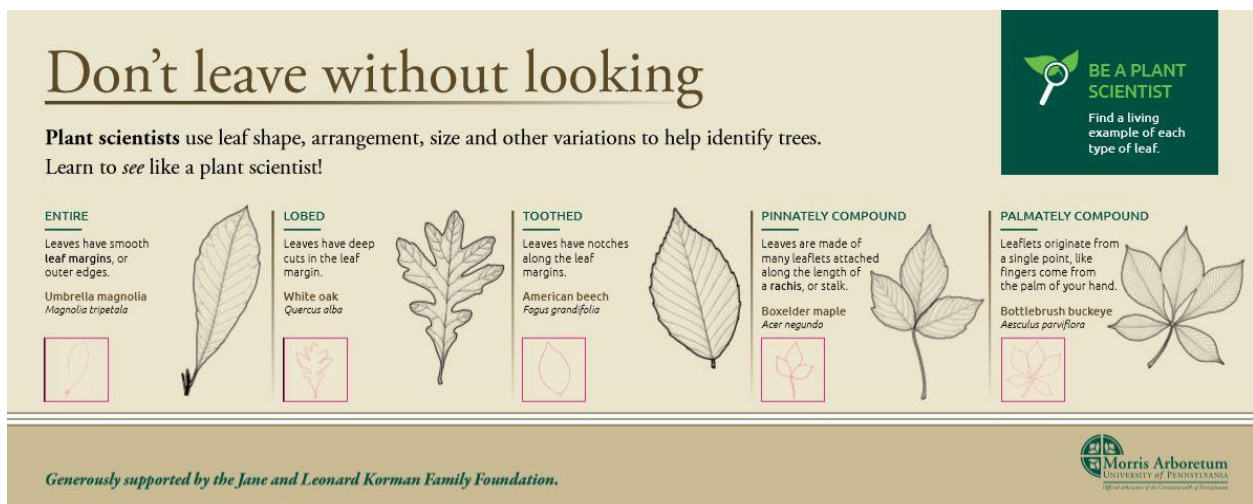


Figure 1. “Don’t leave without looking.” Interpretative panel located on Out-on-a-Limb, 12” x 30.” Panel draft as of March 20, 2019.⁶

The rubbing stations on this panel are the same leaves described on the panel. I made this choice in order to pair visual observation (the panel is titled “Don’t leave without *looking*”) with tactile interaction. *Magnolia tripetala*, *Quercus alba*, *Fagus grandiflora*, *Acer negundo* and *Aesculus parviflora* were chosen in particular because living examples of these species are near or around

⁵ For more on Arboretum visitor path, see Appendix A.

⁶ NOTE: As of publication time, panels and “Your guide to Tree Adventure” still in draft. This publication reflects progress as of 3-20-19.

Out-on-a-Limb. In particular, existing interpretive panels on Out-on-a-Limb highlight *Magnolia*, *Quercus* and *Fagus* species, providing guests with an image of the leaves and plant, regardless of the season.

After leaving Out-on-a-Limb, most visitors head toward the Rose Garden, where the “Every ring tells a story” is located. This panel offers a brief description of how to read tree rings. For visitors who want more information, the panel also offers information about earlywood and latewood, to describe why it is that tree rings are so distinctive. In addition, the panel offers information about the variation one may see in the cross-section of the trunk, touching on tree scars, asymmetry and variation in growth. Earlier versions of this panel focused on fire scars, but after consulting with Tim Block, the panel was re-worked to highlight the kinds of phenomena trees in this ecoregion experience. Rubbing stations on the panel include a smaller version of a tree cookie and a bracket fungi.



Figure 2. “Every ring tells a story.” Interpretive panel located by Rose Garden, 18” x 24.” Draft as of March 20, 2019.

From the Rose Garden, many visitors next walk down Oak Allée where “Get to the root of things” will be located. The driving message behind this panel is that even though we may not see them every day, tree roots make up a large component of a tree’s biomass and play an essential role in every tree’s life. This panel highlights roots’ main functions as tree stabilization, water and nutrient absorption, energy storage, and mycorrhizae relationships. This panel also offers a botanically correct drawing of tree roots showing that roots extend much farther horizontally and more shallowly than people often imagine. The rubbing station a closer view of root hairs.

Get to the root of things

Fine roots make up 20-40% of a tree's weight. It is important that we are gentle around roots.

STABILIZATION
Roots anchor trees.

STORAGE
Roots help store the sugars trees make and use for energy.

ABSORPTION
Microscopic root hairs act like tiny straws that soak up water and minerals into the tree.

BOTH GET WHAT THEY NEED
Many roots work together with fungi.

- Fungi help roots absorb nutrients.
- Roots provide fungi with essential elements like carbon.

? DID YOU KNOW?
The relationship between roots and fungi is called mycorrhizae (my-co-rye-see).

Depth in ft. 0 1 2 3 4 5

Depth in meters 0 0.5 1.0 1.5

Each root hair is about the thickness of a hair on your head!

Generously supported by Carole Haas Gravagno and the Jane and Leonard Korman Family Foundation.

Morris Arboretum
UNIVERSITY OF PENNSYLVANIA
Official Arboretum of the Commonwealth of Pennsylvania

Figure 3. “Get to the root of things.” Interpretative panel located on Oak Allée, 18” x 28.” Draft as of March 20, 2019.

Trifold



Figure 4. "Your Guide to Tree Adventure." Left side is outside cover, right inside panels. Draft as of March 20, 2019.

The second component of this project was to write and design a trifold titled "Your Guide to Tree Adventure." This pamphlet functions both as map of the Arboretum and a place for visitors to collect rubbings.

The front cover of the design features the sheep on the Magnolia Slope. This vista was chosen because all visitors, including first timers, have the opportunity to recognize the view, giving them a sense of ownership and familiarity for the space. Fittingly, a tree cartoon is where visitors can collect rubbings from Tree Adventure. In early trifold designs, we considered the idea of having "puzzle pieces" (pieces of an image visitors could only complete if they went to all Tree Adventure branded signs). Ultimately, however, we decided to go for an "embellishment mode" (Figure 4), because it will easily grow as Tree Adventure does, instead of locking the concept into the three panels designed this year. The magnifying glass motif was used to give the trifold some continuity between the signs.

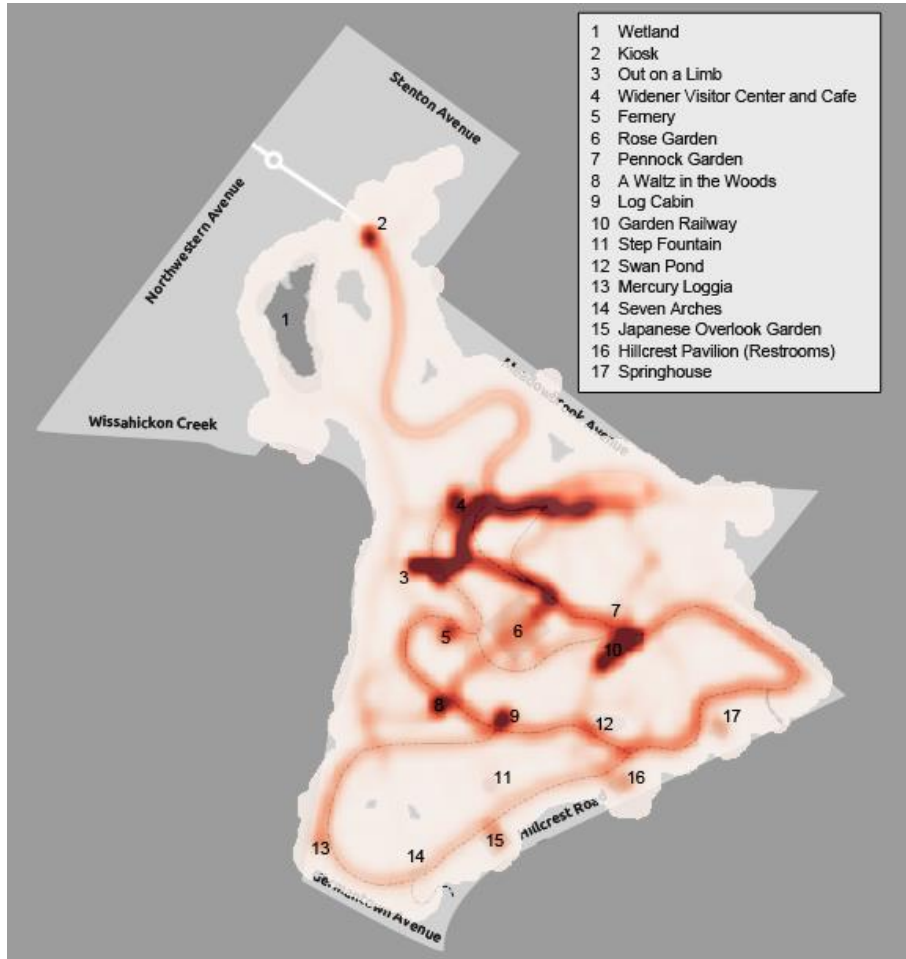
Inside the trifold offers a brief introduction on how to use the rubbing sheet on back (special note to guests to use a graphite pencil!) and the guiding principle that "we need trees and trees need us to protect them."

CONCLUSION

As I said many times throughout the project, good interpretation is relentlessly collaborative; in order to best anticipate and accommodate guest's different learning styles, you need a wide range of reviewers.

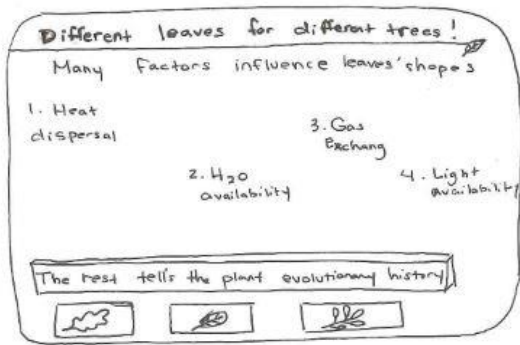
Throughout this process the Interpretation Committee was an invaluable in keeping the project on track – thank you to Liza Hawley, Jan McFarlan, Bryan Thompson-Nowak, Bob Gutowski, Jenn Woodring-Shea and Jeff Clark. Thank you to Cindy Skema, Tim Block and Tony Aiello for lending their knowledge about plants. Amanda DeLeo and Christine Pape, thank you for your help with the “Your Guide to Tree Adventure,” it was your guidance that transformed sketches into a reality! Thank you to Anne Marie Kane of Imogen Designs for so patiently working through my many meticulous edits and lending your artistic eye. To the Education Committee, your feedback kept this project playful – thank you Bette Perelman, Lisa Bailey, Joan Kober, Katie Brown and Judith Pyle. To Kevin and Brian from DirectEmbed, thank you for embarking on something new – I think it was well worth it. To Lucy Dinsmore, Genevieve Senechal, Kate Deregibus, Drew Hawkes, Vince Marrocco, and the guides who helped me in the planning process and everyone else, thanks for your consultation!

APPENDIX A: Heat Maps

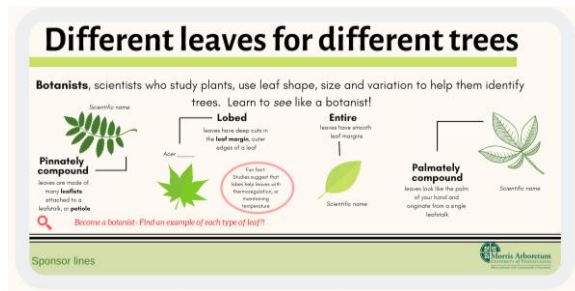


APPENDIX B: Selected Drafts of Signs

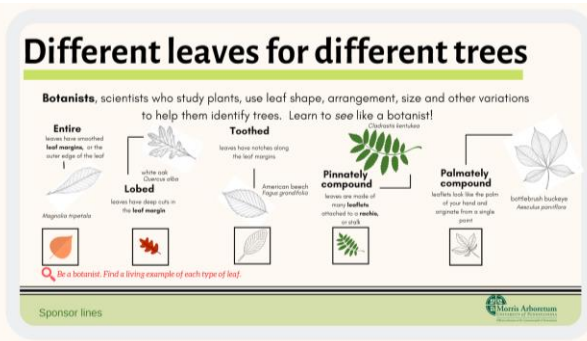
Don't Leave without looking



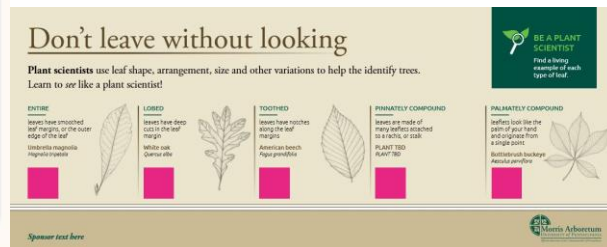
Version 1



Version 2

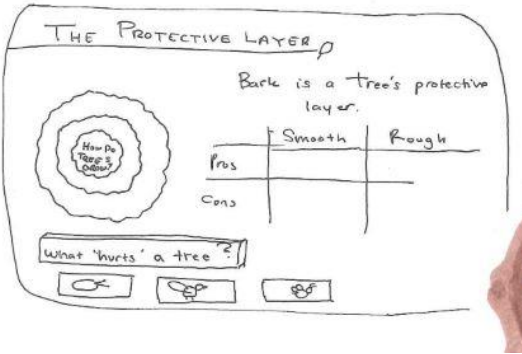


Version 4



Version 10

Every ring tells a story



Version 1

How do trees grow?

Every tree tells a story
By looking at the relative size and consistency of growth rings, scientists use trees to investigate the climate of the past.

Trees grow up, out and down!
Each year, trees add a new layer of woody tissue outside of the previous year's growth. This growth originates in the **cambium layer**, where the tree produces new cells.

How to read tree rings
Scientists use tree rings to estimate a tree's age. Trees grow in layers, the newest bark closest to the outer layer. Because in tree growth later in the spring and summer months, the new cells are larger, and the bark is lighter in color creating an alternating pattern in the bark.

Count the alternating light and dark lines to estimate this tree's age!

Tree anatomy: bark, heartwood, sapwood, cambium layer.

Sponsor lines

Version 2

Every ring tells a story

Life can be tough for a tree!
By looking at the relative size and consistency of growth rings, scientist can learn about environmental conditions during a tree's life.

How to read tree rings
Trees grow in layers with the newest wood closest to the outer layer. Because a tree grows faster in the spring and summer months, the new cells are larger, and the wood is lighter in color creating an alternating pattern in the trunk.

Count the pairs of light and dark lines to estimate this tree's age!

WHAT HAPPENED IN THIS TREE'S LIFE?

Fire scar
Wind
Rainy season
Dry season

Sponsor lines

Version 3

Every ring tells a story

How to read tree rings
Trees grow in layers! By counting the pairs of light and dark stripes, scientists can learn a tree's age.

Tree scars
Just like us, trees get injured. While we heal, trees seal their injuries to prevent further infection.

Asymmetry
A tree's central ring isn't always perfectly centered. Factors such as light availability, wind, weight and injury can all pull a tree off-center. Just that doesn't mean the tree isn't healthy!

Variation in rings
Not every ring looks the same. When a tree has access to more resources it can grow more in a single season.

Count the pairs of light and dark lines to estimate this tree's age!

Sponsor lines

Version 6

Every ring tells a story

LOOK CLOSER
Count the pairs of light and dark lines to estimate this tree's age!

HOW TO READ TREE RINGS
Trees grow in layers! By counting the pairs of light and dark stripes, scientists can learn a tree's age. In many trees, earlywood is a lighter color because new cells are larger and more porous. Latewood, by contrast, appears darker because the cells are more compact.

TREE SCARS
Just like us, trees get injured. While we heal, trees seal their injuries to prevent further infection.

ASYMMETRY
A tree's central ring isn't always perfectly centered. Factors such as light availability, wind, weight and injury can all pull a tree off-center, but that doesn't mean the tree isn't healthy!

VARIATION IN RINGS
Not every ring looks the same. When a tree has access to more resources it can grow more in a single season.

Sponsor text here

Version 7

Every ring tells a story

LOOK CLOSER
Count the pairs of light and dark lines to estimate this tree's age!

HOW TO READ TREE RINGS
Trees grow in layers! By counting the pairs of light and dark stripes, scientists can learn a tree's age.

TREE SCARS
Just like us, trees get injured while we heal, trees seal their injuries to prevent further infection.

ASYMMETRY
Factors such as light availability, wind, weight and injury can all pull a tree off-center, but that doesn't mean the tree isn't healthy!

VARIATION IN RINGS
Not every ring looks the same. When a tree has access to more resources it can grow more in a single season.

Sponsor text here

Version 9

Get to the root of things



Version 1

Let's get to the root of things

FOR A TREE?
According to plant scientists, tree height is capped at 130 m because any taller and the pull of gravity would be too great for water to reach the highest branches!

Did you know?
There's a limit to how tall a tree can get. It's not just because of gravity, it's also because of the way water and nutrients are carried through the plant.

In order for plants to survive, they need to deliver water, nutrients, sugar and minerals between the tips of the roots and the tops of the leaves.

Vascular plants like trees have a specialized plumbing system that carries water and nutrients from soil to the leaves for use in photosynthesis, and moves sugar from leaves into other parts of the plant for energy and storage.

XYLEM
It's the vascular tissue through which water and nutrients are carried through the plant.

PHLEOM
It's the vascular tissue that carries sugar from photosynthesis from the leaves throughout the plant.

Sponsor lines

Morris Arboretum
University of Pennsylvania

Version 2

Let's get to the root of things

FOR A TREE?
According to plant scientists, tree height is capped at 427 ft because any taller the pull of gravity would be too great for water to reach the highest branches!

Did you know?
There's a limit to how tall a tree can get. It's not just because of gravity, it's also because of the way water and nutrients are carried through the plant.

In order for plants to survive, they need to deliver water, nutrients, sugar and minerals between the tips of the roots and the tops of the leaves.

Vascular plants like trees have a specialized "plumbing" system that carries water and nutrients from soil to the leaves for use in photosynthesis, and moves sugar from leaves into other parts of the plant for energy and storage.

XYLEM
It's the vascular tissue through which water and nutrients are carried throughout the plant.

PHLEOM
It's the vascular tissue that carries sugar from photosynthesis from the leaves throughout the plant.

Morris Arboretum
University of Pennsylvania

Version 3

Get to the root of things

DID YOU KNOW?
20-40% of a tree's weight is in its delicate roots, therefore it is important that we are gentle around roots.

Storage
Roots help store the sugar trees use for energy.

Stabilization
Roots keep trees in place like an anchor.

A Mutually Beneficial Relationship
Many trees form symbiotic relationships with fungi. These relationships are called **mycorrhizae**. Fungi help roots absorb nutrients like carbon.

Absorption
Microscopic root hairs act like tiny straws that suck up water and minerals into the tree.

Eggroot hair is about the thickness of a hair on your head!

Morris Arboretum
University of Pennsylvania

Version 6

Get to the root of things

DID YOU KNOW?
20-40% of a tree's weight is in its delicate roots, therefore it is important that we are gentle around roots.

A MUTUALLY BENEFICIAL RELATIONSHIP
Many roots form symbiotic relationships with fungi. These relationships are called **mycorrhizae**.
• Fungi help roots absorb nutrients.
• Roots provide fungi with essential nutrients like carbon.

STABILIZATION
Roots keep trees in place like an anchor.

STORAGE
Roots help store the sugar trees use for energy.

ABSORPTION
Microscopic root hairs act like tiny straws that suck up water and minerals into the tree.

EACH ROOT HAIR IS ABOUT THE THICKNESS OF A HAIR ON YOUR HEAD!

Sponsor text here

Morris Arboretum
University of Pennsylvania

Version 7

Get to the root of things

DID YOU KNOW?
The relationship between roots and fungi is called **mycorrhizae** for **my** roots and **rhizae** for **root** feet.

20-40% of a tree's weight is in its delicate roots, therefore it is important that we are gentle around roots.

STABILIZATION
Roots keep trees in place like an anchor.

STORAGE
Roots help store the sugar trees use for energy.

ABSORPTION
Microscopic root hairs act like tiny straws that suck up water and minerals into the tree.

BOTH GET WHAT THEY NEED
Many roots work together with fungi.
• Fungi help roots absorb nutrients.
• Roots provide fungi with essential elements like carbon.

EACH ROOT HAIR IS ABOUT THE THICKNESS OF A HAIR ON YOUR HEAD!

Sponsor text here

Morris Arboretum
University of Pennsylvania

Version 8

Get to the root of things

20-40% of a tree's weight is in its delicate roots, therefore it is important that we are gentle around roots.

STABILIZATION
Roots keep trees in place like an anchor.

STORAGE
Roots help store the sugars trees make and use for energy.

ABSORPTION
Microscopic root hairs act like tiny straws that suck up water and minerals into the tree.

BOTH GET WHAT THEY NEED
Many roots work together with fungi.
• Fungi help roots absorb nutrients. • Roots provide fungi with essential elements like carbon.

DID YOU KNOW?
The relationship between roots and fungi is called mycorrhizae (my-uh-ree-zay).

Each root hair is about the thickness of a hair on your head!

Spanner text here

Merris Arboretum
University of Connecticut

Version 9

Get to the root of things

Fine roots make up 20-40% of a tree's weight. It is important that we are gentle around roots.

STABILIZATION
Roots anchor trees.

STORAGE
Roots help store the sugars trees make and use for energy.

ABSORPTION
Microscopic root hairs act like tiny straws that suck up water and minerals into the tree.

BOTH GET WHAT THEY NEED
Many roots work together with fungi.
• Fungi help roots absorb nutrients. • Roots provide fungi with essential elements like carbon.

DID YOU KNOW?
The relationship between roots and fungi is called mycorrhizae (my-uh-ree-zay).

Each root hair is about the thickness of a hair on your head!

Generously supported by Carole Haas Crasnow and the Jane and Leonard Korman Family Foundation.

Merris Arboretum
University of Connecticut

Version 12