



Backpack Tour: **Prehistoric Adventure**

Facilitator Guide

Preparation Guide

Welcome to the planning phase of your class adventure!

A trip to **Klehm Arboretum** will spark ideas that will enrich your science curriculum all year long!

An **arboretum** is a **botanical garden devoted to trees**. Klehm full of many local, and exotic specimens of trees and shrubs. Distinct from a forest, nursery or park, it is an outdoor museum of plants. Many varieties are grown for research, educational, and ornamental purposes. We are excited to facilitate your class's trip into this living museum!



What To Expect...

The **facilitator guide** will give you a clear picture of your upcoming adventure. From objectives, to suggested discussion questions this is a great guide to **share in advance with your field trip volunteers and small group leaders**.

You will want to bring the FIELD FACILITATOR portion of this with you on the day of the trip: Page 3-5.

We have several suggested classroom activities you can do in preparation for your trip as well as activities to help you continue the momentum when you return "from the field" to your classroom.

When you arrive you will also receive **student backpacks** with supplies for all the activities. Your students may keep the Klehm backpacks as a souvenir.

Activities On Site...

Each of the activities on site will have a student handout and a detailed facilitator handout. Plan for each students to have their own copy and a pencil or other writing tool for making pictures and notes. All the materials you need for the activities will be in the student backpacks provided when you arrive. Students can wear the backpacks as they embark on their adventures around Klehm.



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Bus Unloading, Lunches and Snacks

Students should be dropped off at the Visitor Center upon arrival. Coolers, lunches etc. may be unloaded at this time. Lunch items can be left in the building or transported to a picnic location on the grounds. Vehicles are asked to park in the parking lot during the tours.

Prehistoric Adventures Objectives

Learners will...

1. **Experience and investigate** the many trees living in the Prehistoric Garden.
2. **Analyze** trees of different types
3. **Evaluate** features to determine if all trees are the same
4. **Identify** trees in the garden
5. **Observe and analyze** parts of the trees
6. **Create** a model and **indicate** where they found different trees
7. **Evaluate** locations and **determine patterns** in location, resources, needs, etc

Our activities use “Inquiry Style” learning

Scientific **Inquiry** is the **study of the natural world and proposal of explanations** based on the evidence obtained. Students use this method by developing knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world through hands on experimentation and exploration.

Scientific inquiry is a powerful way of understanding science content.

Students **learn how to ask questions and use evidence** to answer them. In the process of learning the strategies of scientific inquiry, students learn to conduct an investigation and collect evidence from a variety of sources, develop an explanation from the data, and communicate and defend their conclusions.

The National Science Teacher Association recommends that all K–16 teachers embrace scientific inquiry.

Enjoy the Inquiry!

If your students come up with a **hypothesis** (an idea you can test...) this trip is a great opportunity to try it out! Or, consider taking some of our ideas back to your classroom...to continue the momentum.

Prehistoric Adventure Materials

Field Adventurer Supplies (Provided By Klehm)

- 1 Backpack
- 1 Magnifying Glass
- Klehm Map
- Pencil
- Clipboard
- Paper Handout/School Journal



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Activity Overview

Student Conducted Field Work

Part 1: Observation

Arrive and Examine the trees: What Do you See? (5 min)

Part 2: Analysis of Gingko Biloba

- Team leader (Adult) demonstrates tree analysis.
- Students examine the Gingko Biloba, noting various properties of the tree and its various parts.
- Students examine and record findings on paper
- Students design investigation for obtaining information from other locations.
- Students execute and discuss- team leader (Adult) leads discussion.

Part 3: Analysis of Dawn Redwood

- Team leader (Adult) demonstrates tree analysis.
- Students examine the Dawn Redwood, noting various properties of the tree and its various parts.
- Students examine and record findings on paper.
- Students design investigation for obtaining information from other locations.
- Students execute and discuss- team leader (Adult) leads discussion.

Part 4: A Comparison of Gingko Biloba & Dawn Redwood

- Look closely at your observation notes for both trees. What do you notice that is unique about each tree? Identical? (10 min)
- Comparison Activity: Compare the Gingko Biloba tree to the Dawn Redwood tree. Compare and Contrast features of the two prehistoric trees.
- What features are unique to each tree. Why does one tree have different characteristics than another?

NGSS Connections

3-5 Science Standards

| | |
|-------|--|
| LS4.C | Particular Organisms can only survive in particular environments |
| LS4.B | A range of different organisms live in different places |
| | Organisms live in a variety of habitats |
| LS4.D | Change in the habitat effects the animal living there |

| | |
|---|--|
| 1: Ask Questions & Define Problems | 3-5: Ask questions about what would happen if a variable is changed; predict reasonable outcomes based on patterns such as cause and effect relationships; use prior knowledge to describe problems that can be solved. |
| 2: Develop and Use Models | 3-5: Identify limitations of models; revise a model based on evidence; develop a diagram |
| 3: Planning and Carrying Out Investigations | 3-5: Plan and conduct an investigation to produce data as the basis for evidence --variables are controlled, number of trials considered; evaluate appropriate methods and/or tools for collecting data; make predictions about what would happen if a variable changes. |
| 4: Analyzing and Interpreting Data | 3-5: Represent data in tables and/or various graphical displays to reveal patterns that indicate relationships; |



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Analyze and interpret data to make sense of phenomena, compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.



NGSS HINT:

Develop and Use Models: From the drawings on their note sheets students will be creating, comparing and revising their models. Encourage Students to LABEL their diagrams, draw arrows to indicate movement, etc.



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Field Facilitator Part 1: Tree Observation

Inquiry Procedure

1. Students find a space in the Prehistoric Garden
2. Ask students to quietly observe
3. What Do you See?
4. Students can sketch their observation on their handout



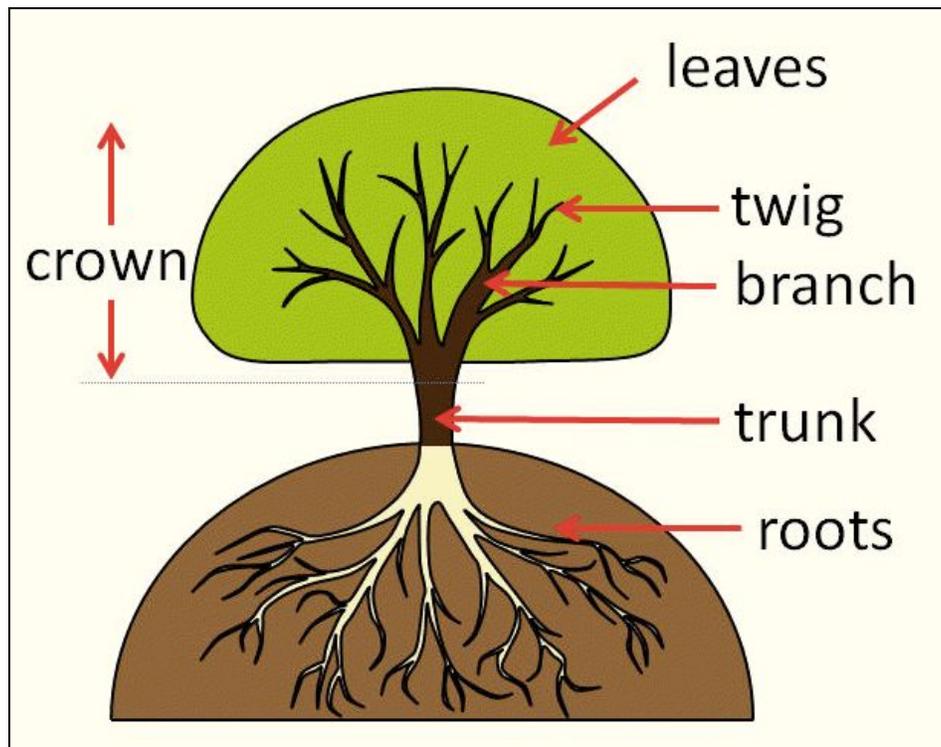
Inquiry HINT:

Students may not know what to look for. Try guiding questions to prompt their observations.

Try Saying to students...

What do you notice about the trees? (Trees have many characteristics that are the same; however, they are specific features that are distinctly different about various trees as well. Help students to make observations of these characteristics)

Are there trees that are similar/different? How? Why? (Trees have unique features for different reasons. Help students to create a mental hypothesis as to why trees have unique characteristics)



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What do you think the first plants look like? (The very first plants were actually single celled algae floating in water. Trees came much later when plants started to live on land.)

How are prehistoric trees different than modern trees? (Actually not all that different! Swamp dwelling plants were replaced by the more advanced conifers--cone bearing trees--, which were better adapted to the changing climatic conditions. Flowers didn't come until much later)





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Field Facilitator Part 2: Analysis of Gingko Biloba

| Materials | Inquiry Procedure | |
|--|---|--|
| <ul style="list-style-type: none"><input type="checkbox"/> Pencil<input type="checkbox"/> Clipboard<input type="checkbox"/> Paper Handout/School Journal<input type="checkbox"/> Magnifying Glass<input type="checkbox"/> Molding Clay | <ol style="list-style-type: none">1. Team leader (Adult) demonstrates tree analysis.2. Students examine the Gingko Biloba, noting various properties of the tree and its various parts.3. Students examine and record findings on paper4. Students design investigation for obtaining information from other locations.5. Students execute and discuss- team leader (Adult) leads discussion.6. Press a leaf into clay to mimic the type of a fossil: mold fossil. Choose a leaf--use one from the GROUND! (a mold fossil is formed by a fossilized impression made in the substrate - a negative image of the organism) | <div style="text-align: center;"></div> <p>Inquiry HINT: Tree Analysis Ensure students notice the various parts of a tree (trunk, branches, twigs, leaves), noting the details of each part.</p> |

Try Saying to students...

Look at the bark. What do you notice? (Encourage students to feel the tree)

Look at the branches and leaves. What do you notice? (Encourage students to observe the tree)

Why is this a prehistoric tree? (Fossils show us that Gingkos first appeared in the early Jurassic which means Gingkos may have served as a food source and hiding spot for dinosaurs. Though the Gingkos in Northern America went extinct, several survived in modern day China and have been planted back in Northern America.)





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Field Facilitator Part 3: Analysis of Dawn Redwood

| Materials | Inquiry Procedure | |
|--|---|--|
| <ul style="list-style-type: none"><input type="checkbox"/> Pencil<input type="checkbox"/> Clipboard<input type="checkbox"/> PaperHandout/School Journal<input type="checkbox"/> Magnifying Glass | <ol style="list-style-type: none">1. Team leader (Adult) demonstrates tree analysis.2. Students examine the Dawn Redwood, noting various properties of the tree and its various parts.3. Students examine and record findings on paper.4. Students design investigation for obtaining information from other locations.5. Students execute and discuss- team leader (Adult) leads discussion. |  Inquiry HINT: Tree Analysis Ensure students notice the various parts of a tree (trunk, branches, twigs, leaves), noting the details of each part. |

Try Saying to students...

Look at the bark. What do you notice? (Encourage students to feel the tree)

Look at the branches and leaves. What do you notice? (Encourage students to observe the tree)

How long ago do you think these trees were on Earth? (Fossils show us that Redwoods were around as long as 65 million years ago! This was the end of the Cretaceous period, the last time that dinosaurs, like Tyrannosaurus rex, Triceratops, and Velociraptor roamed the earth.)

What do you notice that is the same/different from when you observed the Ginkgo Biloba tree? (Encourage students to note the qualities of the Dawn Redwood while keeping mental note of how this tree compares to the Ginkgo Biloba)



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Field Facilitator Part 4: Comparison of Ginkgo Biloba & Dawn Redwood

| Materials | Inquiry Procedure | |
|--|--|--|
| <ul style="list-style-type: none"><input type="checkbox"/> Pencil<input type="checkbox"/> Clipboard<input type="checkbox"/> Paper Handout/School Journal | <ol style="list-style-type: none">1. Look closely at your observation notes for both trees. What do you notice that is unique about each tree? Identical? (10 min)2. Comparison Activity: Compare the Ginkgo Biloba tree to the Dawn Redwood tree. Compare and Contrast features of the two prehistoric trees.3. What features are unique to each tree. Why does one tree have different characteristics than another? |  Inquiry HINT: THINK of what you know about trees. What characteristics of trees are vital for survival of all trees? What characteristics are unique to a specific tree or a specific reason? |

Try Saying to students...

What do you notice that is the same? (Trees have many of the same features, while still having their own unique features as well. What parts of the two trees are identical. What parts of the trees are similar?)

What do you notice that is different? (Trees have features that are unique to each for specific reason. What is a reason you think trees have unique features, distinct from each other?)

Why do you think these trees have different and/or similar features? (What is it about these trees that makes them unique? Is there a reason trees need specific design? ex: predators)

