

# Identifying Trees and Developing a Class Herbarium

## Introduction

What do you see first when you look at a group of trees? They are not all alike. The easiest way to identify a tree is to use a tree key. There are many different structures you need to know in order to use the key correctly. The definitions are usually at the beginning of the tree identification key, accompanied by a picture to describe how to use them.

Once you think you have identified your tree, the pictures in the book will help you to see if you are correct. An even better method is to start a herbarium collection at your school so that you can compare your sample to locally grown specimens. This exercise is in four parts; collecting, identifying, pressing, and mounting the specimens.

## Questions

1. What is the name of this tree?
2. Can I match it with our resource books?

## Hypothesis

*Students should make up their own before continuing.*

## Objectives

1. Identify the trees found on your school grounds.
2. Identify the major parts of a tree needed for identification.
3. Demonstrate the proper technique for collecting and mounting a herbarium specimen.
4. Create a quality herbarium specimen for the class collection.

## Materials

Pruning shears	Notebook for class data
Plant press	8.5" x 14" copy paper
Tree identification key	Newspaper
Tree and shrub books	White glue (Elmer's)
Herbarium stickers	2' x 2' plexiglass
Wax paper	

## Procedure

## **Identification:**

1. Find the tree assigned to you and use the tree identification key to identify the specimen.

## **Collecting:**

2. Find a branch on the tree, with the leaves in good condition, that can be reached by one member of your group. Be sure to gather a twig and leaves that will fit on the piece of paper, and not larger.
3. Check with your teacher, then use the pruning shears to make the cut at a diagonal so that the pith can be seen.
4. Place the samples on the inside of a half folded newspaper.
5. Data collected by the group is recorded on the attached sheet, or in your logbook. These records may be important if the identification of your specimen is questioned.
6. The date, location on the grounds, city, and person who identified it should be noted.

## **Pressing:**

7. On returning to school with your specimens in the newspapers, the teacher will give each specimen a number before the sample is put in the press.
8. Specimens should not hang outside the newspaper when placed in the press, and should be piled neatly.
9. First put down one of the wood frames of the press, followed by 2 cardboard aerators. Next, place one blotting page before the newspaper containing the leaf, followed by another blotting page and the other leaves. Insert one or two cardboard aerators before the next layer.
10. Once all the collected materials are stacked, put two cardboard aerators and the wood frame on top.
11. Place the straps around each end and then pull as tight as possible.
12. The press can be left to dry slowly over 48-96 hours. Some type of device to heat air and blow it through the plant press can be used for faster drying, which preserves color better. Ovens are too hot. Leaves can tolerate a maximum temperature of 130°F.

## **Mounting:**

13. Once the plants are dried, they can be left in the paper, or can be mounted on 11 x 17 inch herbarium paper. Check to see if the pressed plants will fit on the paper before gluing. If necessary, prune to make the leaves fit correctly on the paper.
14. Secure the plant parts to the paper with a solution of 60% white glue and 40% water solution.
15. Place glue on a plexiglas or other large smooth surface and gently lay the specimen in the glue solution until all parts are covered.
16. Lift specimen carefully on to the paper and center it so that all parts are visible.
17. Apply the herbarium labels, or place the needed information in the lower right hand corner.

## **Results:**

1. Prepare a data sheet for the class inventory of all collected specimens. Include tree common name, genus and species name, code number, and the location where it was found on you school site.

## Discussion Questions

1. We identified trees by leaves, what are three other plant parts that could be used to identify trees? Why?
2. What are three advantages of knowing how to identify a tree?
3. Describe the two most useful characteristics of tree identification that you used. Why?
4. Do you think that some closely related trees would be hard to identify? Explain.

**Conclusions** Write a statement explaining how much of your hypothesis was correct. Is there anything that occurred during this exercise that you didn't expect to happen? If you were to do this exercise again, how would you do it differently?

## Terminology

*(This is for all levels. Ask your teacher which words you need to know.)*

### Needle-like leaves

scale-like  
bundles  
tufts  
single needles  
deciduous  
drooping branches  
sheath  
brittle margins  
stiff  
4-sided  
3-sided  
hairy twigs  
scales  
fan-shaped  
shapes

### Broadleaf with net venation

pinnate / palmate  
alternate / opposite  
compound / simple  
stem  
length / hairy  
main vein  
rough texture  
smooth / toothed  
regular / irregular  
serrated / lobed  
entire / wavy  
venation  
palmate / pinnate  
parallel  
heart / ovate

### Leaf Morphology

blade  
midrib  
stipule

### Stem and Bud Morphology

terminal bud  
lateral bud  
bud scale

stem  
leaf  
petiole  
bud  
leaflet

terminal bud scale scar  
leaf scar  
lenticel  
bundle trace  
pith

<p>Herbarium_____</p> <p>Scientific name_____</p> <p>_____</p> <p>Habitat_____</p> <p>Locality_____</p> <p>Collector_____</p> <p>Determined by_____</p> <p>No._____</p>	<p>Herbarium_____</p> <p>Scientific name_____</p> <p>_____</p> <p>Habitat_____</p> <p>Locality_____</p> <p>Collector_____</p> <p>Determined by_____</p> <p>No._____</p>
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<p>Herbarium_____</p> <p>Scientific name_____</p> <p>_____</p> <p>Habitat_____</p>	<p>Herbarium_____</p> <p>Scientific name_____</p> <p>_____</p> <p>Habitat_____</p>
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\_\_\_ evergreen                      \_\_\_ deciduous                      \_\_\_ awl  
\_\_\_ Needle                              \_\_\_ scale                              \_\_\_ length of needles  
\_\_\_ # of needles in bundle

Description of cone

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Color of needles \_\_\_\_\_

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**BROADLEAF:**

\_\_\_ evergreen                      \_\_\_ deciduous

**Leaf:**

\_\_\_ opposite                      \_\_\_ alternate  
\_\_\_ simple                              \_\_\_ compound  
\_\_\_ palmate                              \_\_\_ pinnate

**Margin:**

\_\_\_ entire                              \_\_\_ serrated                              \_\_\_ wavy  
\_\_\_ lobed                              \_\_\_ # of lobes                              \_\_\_ other margins

**Venation:**

\_\_\_ palmate                              \_\_\_ pinnate                              \_\_\_ parallel

***Possible extra data:***

\_\_\_ tree height                      \_\_\_ tree spread  
\_\_\_ length of petiole                      \_\_\_ bud length                      \_\_\_ bark color  
\_\_\_ flower color                      \_\_\_ season                      \_\_\_ fruit size  
\_\_\_ fruit type                              \_\_\_ fruit color

[To Download Student Tree Identification Chart - Table C PDF](#) 

**Plant Parts Checklist:**

Student Guide

- |   |                                      |  |
|---|--------------------------------------|--|
| <input type="checkbox"/> Parallel           | <input type="checkbox"/> Palmate     | <input type="checkbox"/> Pinnate         |
| <input type="checkbox"/> Rosette            | <input type="checkbox"/> Alternate   | <input type="checkbox"/> Opposite        |
| <input type="checkbox"/> Entire             | <input type="checkbox"/> Serrated    | <input type="checkbox"/> Double serrated |
| <input type="checkbox"/> Awl shaped         | <input type="checkbox"/> Lobed       |  |
| <input type="checkbox"/> Pinnately compound | <input type="checkbox"/> Simple      |  |
| <input type="checkbox"/> Palmately compound | <input type="checkbox"/> Blade       |  |
| <input type="checkbox"/> Petiole            | <input type="checkbox"/> Rachis      | <input type="checkbox"/> Leaflet         |
| <input type="checkbox"/> Ovate              | <input type="checkbox"/> Obovate     | <input type="checkbox"/> Deltoid         |
| <input type="checkbox"/> Lanceolate         | <input type="checkbox"/> Spatulate   | <input type="checkbox"/> Cordate         |
| <input type="checkbox"/> Needle             | <input type="checkbox"/> Petal       | <input type="checkbox"/> Sepal           |
| <input type="checkbox"/> Stamen             | <input type="checkbox"/> Pistal      | <input type="checkbox"/> Terminal bud    |
| <input type="checkbox"/> Bundle scar        | <input type="checkbox"/> Bud scale   | <input type="checkbox"/> Lateral bud     |
| <input type="checkbox"/> Node               | <input type="checkbox"/> Leaf scar   | <input type="checkbox"/> Bud scale Scar  |
| <input type="checkbox"/> Internode          | <input type="checkbox"/> Lenticel    |  |
| <input type="checkbox"/> Dehiscent          | <input type="checkbox"/> Indehiscent | <input type="checkbox"/> Berry           |
| <input type="checkbox"/> Multiple fruit     | <input type="checkbox"/> Pod         |  |
| <input type="checkbox"/> Pome               | <input type="checkbox"/> Drupe       | <input type="checkbox"/> Pith            |
| <input type="checkbox"/> Rhizome            | <input type="checkbox"/> Root hair   | <input type="checkbox"/> Bulb            |

*Numbered pressed materials illustrating some of these terms are included with the Forester's Trunk inventory. Preparing these samples could also be a class project to build on over several years.*

[To Download Plants Parts Checklist Student Guide PDF](#) 

### Background Information

Once the students have accomplished the task of learning to use the tree identification key (*May Watts Tree Finder* from Forester's Trunk), they should be ready to develop the class herbarium. Following the student format, each student group should be assigned a specific number of specimens to collect.

### Target Group

Elementary through high school, with modifications necessary in the amount of collecting each level completes.

### Timeline:

This lab can be done with all the students at the beginning of the unit. The students need to understand and be able to use the tree identification key (*May Watts Tree Finder* from the Forester's Trunk). These keys are not all inclusive but the students can usually identify the species of the trees. Other resources are available in the trunk to check on their identification. Herbarium specimens from previous classes can also be used to confirm identification. This is one of the reasons to have one or more herbarium specimens for each of the trees identified on your site.

## Placement of Lab in the Curriculum

This lab is appropriate at the time you are covering other data exercises or classification lessons from your text. It can also be used to get students to gather, organize and prepare data for future analysis. This lab is best if scheduled at the beginning of the year, especially since the trees are in full leaf at that time.

## Student Learning Objectives

1. Compare living trees by applying a classification scheme to them.
2. Identify errors made in identification by other students.
3. Gather specimens for a herbarium.

## Evaluation

Collection and preparation of herbarium mounts can be used as the major tool in assessment. The correct identification of the tree and/or tree parts can be used for pre- or post-evaluation.

## Preparation and Teaching Tips

The teacher will need to provide newspaper for pressing the plants, white glue that has been mixed with water in a 60/40 solution for mounting leaves, and a smooth surface to spread the glue on. The best size paper for making the herbarium mounts is 8.5 x 14 inches. The teacher may have to instruct students on the proper method for collecting leaves without denuding trees. Assigning trees to student groups once they have been numbered can alleviate many collection problems and group concerns. The students need to be familiar with many of the terms in the lab exercise and the identification key. This can be accomplished by using the pressed samples and the slide set that is part of the Forester's Trunk inventory.

When filling in the Student Identification Chart (Table C), have the students list the pages in the tree identification key (*May Watts Tree Finder* from the Forester's Trunk) that they followed to identify the tree. This can be used to check their work. These can be kept with the pressed plant parts in folders for the students to check.

## Discussion Questions and Conclusion Answers

The questions are all of a higher order nature, and can be done by the group or individually. Answers will vary.

## Blowouts

1. Students can go into the community or to local forest preserve and develop herbarium sets for each area separately. Students can build a plant press and collect all the needed materials for continuing this exercise.
2. Use plant parts checklist to develop class set of materials, similar to the one found in the Forester's Trunk.

## References

1. *May Watts Tree Finder*, May Watts Theilgaard. Nature Study Guild, Berkeley, CA. 1991.
2. *Selecting and Planting Trees*, The Morton Arboretum, Lisle, IL. 1990.
3. *Manual of Woody Plants*, Michael A. Dirr. Stipes Publishing Co., Chamapign, IL. 1975.

# Plant Parts Checklist:

Elementary Level

Teacher Guide

- |                             |                        |                            |
|-----------------------------|------------------------|----------------------------|
| <u>1</u> Parallel           | <u>2</u> Palmate       | <u>3</u> Pinnate           |
| <u>   </u> Rosette          | <u>4</u> Alternate     | <u>5</u> Opposite          |
| <u>   </u> Entire           | <u>   </u> Serrated    | <u>   </u> Double serrated |
| <u>   </u> Awl shaped       | <u>7</u> Lobed         | <u>6</u> Toothed           |
| <u>8</u> Pinnately compound | <u>10</u> Simple       |                            |
| <u>9</u> Palmately compound | <u>11</u> Blade        |                            |
| <u>12</u> Petiole           | <u>   </u> Rachis      | <u>13</u> Leaflet          |
| <u>   </u> Ovate            | <u>   </u> Obovate     | <u>   </u> Deltoid         |
| <u>   </u> Lanceolate       | <u>   </u> Spatulate   | <u>   </u> Cordate         |
| <u>   </u> Needle           | <u>   </u> Petal       | <u>   </u> Sepal           |
| <u>   </u> Stamen           | <u>   </u> Pistal      | <u>   </u> Terminal bud    |
| <u>   </u> Bundle scar      | <u>   </u> Bud scale   | <u>   </u> Lateral bud     |
| <u>   </u> Node             | <u>   </u> Leaf scar   | <u>   </u> Bud scale scar  |
| <u>   </u> Internode        | <u>   </u> Lenticel    |                            |
| <u>   </u> Dehiscent        | <u>   </u> Indehiscent | <u>   </u> Berry           |
| <u>   </u> Multiple fruit   | <u>   </u> Pod         |                            |
| <u>   </u> Pome             | <u>   </u> Drupe       | <u>   </u> Pith            |
| <u>   </u> Rhizome          | <u>   </u> Root hair   | <u>   </u> Bulb            |

*These are the numbered pressed materials in the kit, the remaining could be a class project to build on over the next several years.*

[To Download Plant Parts Checklist: Elementary Level PDF](#) 

Plant Parts Checklist:  
Middle School Level  
Teacher Guide

- |                     |                    |                            |
|---------------------|--------------------|----------------------------|
| <u>1</u> Parallel   | <u>2</u> Palmate   | <u>3</u> Pinnate           |
| <u>4</u> Rosette    | <u>5</u> Alternate | <u>6</u> Opposite          |
| <u>   </u> Entire   | <u>10</u> Serrated | <u>   </u> Double serrated |
| <u>9</u> Awl shaped | <u>7</u> Lobed     |                            |

- |                              |                         |                            |
|------------------------------|-------------------------|----------------------------|
| <u>8</u> Pinnately compound  | <u>11</u> Simple        |                            |
| <u>12</u> Palmately compound | <u>13</u> Blade         |                            |
| <u>14</u> Petiole            | <u>15</u> Rachis        | <u>16</u> Leaflet          |
| <u>17</u> Ovate              | <u>    </u> Obovate     | <u>20</u> Deltoid          |
| <u>    </u> Lanceolate       | <u>    </u> Spatulate   | <u>    </u> Cordate        |
| <u>18</u> Needle             | <u>24</u> Petal         | <u>26</u> Sepal            |
| <u>25</u> Stamen             | <u>27</u> Pistal        | <u>19</u> Terminal bud     |
| <u>21</u> Bundle scar        | <u>    </u> Bud scale   | <u>22</u> Lateral bud      |
| <u>    </u> Node             | <u>    </u> Leaf scar   | <u>    </u> Bud scale scar |
| <u>    </u> Internode        | <u>23</u> Lenticel      |                            |
| <u>    </u> Dehiscent        | <u>    </u> Indehiscent | <u>    </u> Berry          |
| <u>    </u> Multiple fruit   | <u>    </u> Pod         |                            |
| <u>    </u> Pome             | <u>    </u> Drupe       | <u>28</u> Pith             |
| <u>29</u> Rhizome            | <u>30</u> Root hair     | <u>    </u> Bulb           |

[To Download Plant Parts Checklist: Middle School Level PDF](#) 

Plant Parts Checklist:  
High School Level  
Teacher Guide

- |                              |                       |                          |
|------------------------------|-----------------------|--------------------------|
| <u>1</u> Parallel            | <u>2</u> Palmate      | <u>3</u> Pinnate         |
| <u>7</u> Rosette             | <u>4</u> Alternate    | <u>5</u> Opposite        |
| <u>6</u> Entire              | <u>10</u> Serrated    | <u>8</u> Double serrated |
| <u>9</u> Awl shaped          | <u>11</u> Lobed       |                          |
| <u>12</u> Pinnately compound | <u>14</u> Simple      |                          |
| <u>13</u> Palmately compound | <u>15</u> Blade       |                          |
| <u>16</u> Petiole            | <u>17</u> Rachis      | <u>18</u> Leaflet        |
| <u>19</u> Ovate              | <u>22</u> Obovate     | <u>25</u> Deltoid        |
| <u>20</u> Lanceolate         | <u>21</u> Spatulate   | <u>24</u> Cordate        |
| <u>23</u> Needle             | <u>35</u> Petal       | <u>36</u> Sepal          |
| <u>37</u> Stamen             | <u>38</u> Pistal      | <u>26</u> Terminal bud   |
| <u>29</u> Bundle scar        | <u>    </u> Bud scale | <u>27</u> Lateral bud    |
| <u>30</u> Node               | <u>33</u> Leaf scar   | <u>32</u> Bud scale scar |
| <u>31</u> Internode          | <u>34</u> Lenticel    |                          |

39 Dehiscent  
44 Multiple fruit

40 Indehiscent  
45 Pod

41 Berry

43 Pome  
49 Rhizom

42 Drupe  
47 Root hair

46 Pith  
\_\_\_\_ Bulb

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Return to the [Table of Contents](#)