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Construction of a Dichotomous Classification Key

New York State Learning Standards Annotation: MST 1, 1.1 a-b, 1.2a, 1.3a-b, 1.4a, 2.2a, 3.1a; MST 4 1.1a, 1.2a, 2.2a, 3.1a, 3.1h, 5.1a-b, 6.1a-b, 6.2a-b, Appendix A

Background: Pretend that you have all of the clothes you own, for all seasons, heaped into a large pile in the middle of the room. How would you organize the laundry so that you could put it all away neatly? Scientists commonly use a device known as a dichotomous classification key. This sort of key asks questions about the major features of an organism and then starts to separate and categorize each of the unidentified members into closely related groups. As the name implies, “di-“ means two, indicating that each level will ask two contrasting questions about a particular trait.

Laboratory Safety Precautions: The following symbols represent the precautions that are required for this lab:



Purpose: The purpose of this laboratory experience is:

- to develop a classification key based upon trees found in this area.
- to understand how scientists in a variety of fields use classification keys to identify specimens.
- to further understand the necessity of the Linnaean classification system
- to create a “pocket card” to laminate and keep for future tree identification.

Materials: The following materials are needed to complete this laboratory experience:

Lab papers	pen and pencil
Plant specimens (leaves)	Plant specimens (branches)
Lamination	Scrap paper
Laminated copies of tree and leave specimens for “off season” use	

Procedure: The following procedure is utilized to perform this experience:

1. Using the knowledge you have gained from class, review the pages that follow and be sure to be able to identify the various leaf types, needle types, and other identifying characteristics of trees in New York State.
2. You will be provided with two major tree groups: coniferous tree samples and deciduous tree samples. It will be your responsibility to create a dichotomous key that helps you to identify each major group. All samples will be labeled with their common and scientific names. Identifying the tree is not the issue for this lab – creating a usable key is what really matters.

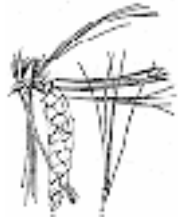

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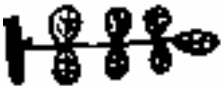
3. Working with your classmates, organize the samples in such a manner that you can create a dichotomous key that appropriately identifies them.
4. Once you have created the key, have another group of students use it to test it for validity and sign off that the key “works”.
5. After your key has been created, use a computer to make a “card” and give it to your teacher to laminate. This card can then be used to identify trees when you are in the field.

Data: The following data was collected during this experience:

Leaf Types

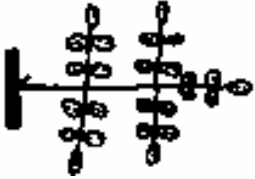
 <p>Needle like leaves, spiny; some in clusters, others in small bundles or singles</p>	 <p>Broad leaf, flat, flexible, often veined</p>
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Leaf Composition



 <p>Simple Leaf - leaves have one leaflet</p>	 <p>Compound Leaf - have several leaflets</p>
 <p>Palmately Compound - leaves have several individual leaflets in a star shape</p>	 <p>Pinnately Compound - leaves have several individual leaflets on a stem</p>

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 <p>Doubly Pinnately Compound - leaflets are pinnately compound</p>	<p>Other leaf arrangements may exist, but they are out of the norm and not taken into consideration in this laboratory experience.</p>
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Leaf Arrangement


 <p>Alternate Leaves - Leaves emerge from the twig kitty-corner from each other</p>	 <p>Opposite Leaves - Leaves emerge from the twig across from each other</p>
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Leaf Border




 <p>Leaf Margin Smooth – border has no teeth or lobes</p>	 <p>Leaf Margin Lobed - border has "ins and outs"</p>
 <p>Margin Toothed - border is jagged</p>	 <p>Leaf Margin Doubly Toothed - the teeth have teeth on them</p>

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 <p>Leaf Margin Lobed and Toothed - the lobes have teeth</p>	<p>Other leaf shapes exist in nature but they will not be considered in this laboratory experience.</p>
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Leaf Veins

 <p>Palmate Leaf Veins – lines all come together</p>	 <p>Pinnate Leaf Veins – lines come to a central line</p>
 <p>Parallel Leaf Veins – lines are next to each other</p>	

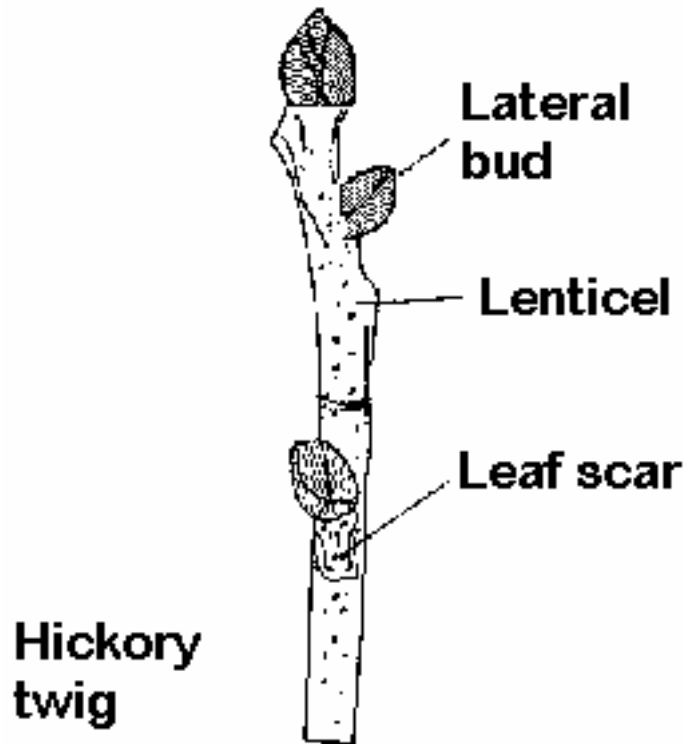
Lobes

 <p>Lobe Sinuses Sharp – 'V' shaped valleys</p>	 <p>Lobe Sinuses Rounded - "U" shaped valleys</p>
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Terminal bud



Hickory
twig

Twig Structure

Now that the “basics” of tree structure that you need for this lab have been discussed, start to develop a dichotomous key for the specimens you have been given. It is your responsibility to look up the scientific name of each specimen – I have provided the common name for each.

Data: The following data was collected in the lab experience:

Make certain that your dichotomous key is attached. A blank copy of the key is included on the next page.

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Conclusion: The following can be concluded from performing this lab experience:

What did you learn to do?

What type of career would you expect to use this activity in? What would you be doing in this career and what sort of benefit would making a key have?

What was the most difficult part of developing your classification key?

Analysis Questions: There are no analysis questions for this experience.

Bibliography of Images Used

Tree ID and Structure Images: <http://ostermiller.org/tree/>

Tree Cards: <http://ostermiller.org/tree/species.html>

(With permission granted by Stephen Ostermiller, May 25, 2005)

Possible Allergy Alert: <http://www.wpclipart.com/medical/sneeze.png>

Gloves Symbol: <http://www.epa.gov/grtlakes/seahome/housewaste/images/glove2.gif>

Plant Precaution Symbol:

<http://68.90.81.6/ScienceTAKS/Integration/Science%20TAKS%20Objective%201/safetysymbols.htm>

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Classification Key for _____

1a. _____ Go to/ID as _____

1b. _____ Go to/ID as _____

2a. _____ Go to/ID as _____

2b. _____ Go to/ID as _____

3a. _____ Go to/ID as _____

3b. _____ Go to/ID as _____

4a. _____ Go to/ID as _____

4b. _____ Go to/ID as _____

5a. _____ Go to/ID as _____

5b. _____ Go to/ID as _____

6a. _____ Go to/ID as _____

6b. _____ Go to/ID as _____

7a. _____ Go to/ID as _____

7b. _____ Go to/ID as _____

8a. _____ Go to/ID as _____

8b. _____ Go to/ID as _____

9a. _____ Go to/ID as _____

9b. _____ Go to/ID as _____

10a. _____ Go to/ID as _____

10b. _____ Go to/ID as _____

11a. _____ Go to/ID as _____

11b. _____ Go to/ID as _____

12a. _____ Go to/ID as _____

12b. _____ Go to/ID as _____

13a. _____ Go to/ID as _____

13b. _____ Go to/ID as _____

14a. _____ Go to/ID as _____

14b. _____ Go to/ID as _____

15a. _____ Go to/ID as _____

15b. _____ Go to/ID as _____

16a. _____ Go to/ID as _____

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16b. _____ Go to/ID as _____

17a. _____ Go to/ID as _____

17b. _____ Go to/ID as _____

18a. _____ Go to/ID as _____

18b. _____ Go to/ID as _____

19a. _____ Go to/ID as _____

19b. _____ Go to/ID as _____

20a. _____ Go to/ID as _____

20b. _____ Go to/ID as _____

21a. _____ Go to/ID as _____

21b. _____ Go to/ID as _____

22a. _____ Go to/ID as _____

22b. _____ Go to/ID as _____

23a. _____ Go to/ID as _____

23b. _____ Go to/ID as _____

24a. _____ Go to/ID as _____

24b. _____ Go to/ID as _____

25a. _____ Go to/ID as _____

25b. _____ Go to/ID as _____

26a. _____ Go to/ID as _____

26b. _____ Go to/ID as _____

27a. _____ Go to/ID as _____

27b. _____ Go to/ID as _____

28a. _____ Go to/ID as _____

28b. _____ Go to/ID as _____

29a. _____ Go to/ID as _____

29b. _____ Go to/ID as _____

30a. _____ Go to/ID as _____

30b. _____ Go to/ID as _____