

Topic 1. Plant Structure

Introduction: Because of its history, several unrelated taxa have been grouped together with plants into the discipline of botany. Given this context, in this first lab we will carefully consider exactly what a plant is in order to better understand why fungi, algae and bacteria are each uniquely different. We will then apply what we learn about plant structure, to introduce the use of a field guide to the common woody plants on campus.

Plants are **photosynthetic autotrophs** which are also **structurally complex**. The tissues of higher plants are organized into **roots, stems, and leaves** which are the organs of the plant body. The leaf and the stem, together, make up the **shoot**. Both leaves and stems are derived from growth at an **apical meristem**. Each leaf is associated with an axillary bud on the stem which can give rise to lateral branches. The upper angle formed by the leaf and stem is called an **axil** and the buds formed in that location are called **axillary buds**.

Teaching resources: The learning objectives are clearly outlined below. We expect you to learn terms relating to plant structure and to be able to relate these to plants in general. We also want you to be able to apply what you learn, in the context of a simple identification guide to the common woody plants on campus. To assist you in reviewing this activity, and all future lab topics, we have a lab page (not at learn@uw!) at

http://botit.botany.wisc.edu/botany_130

Also note that we have an open lab in room 122 from 10:00 until 12:00 every Friday if you want additional help with these and future lab materials.

Learning objectives:

Gross morphology - terms you will be required to know and be able to use

Plant body

root
shoot
stem
leaf

Leaf structure

blade
petiole
compound leaf
stipule

Stem structure

axillary bud
apical meristem
node
internode
bud scales

Leaf arrangement

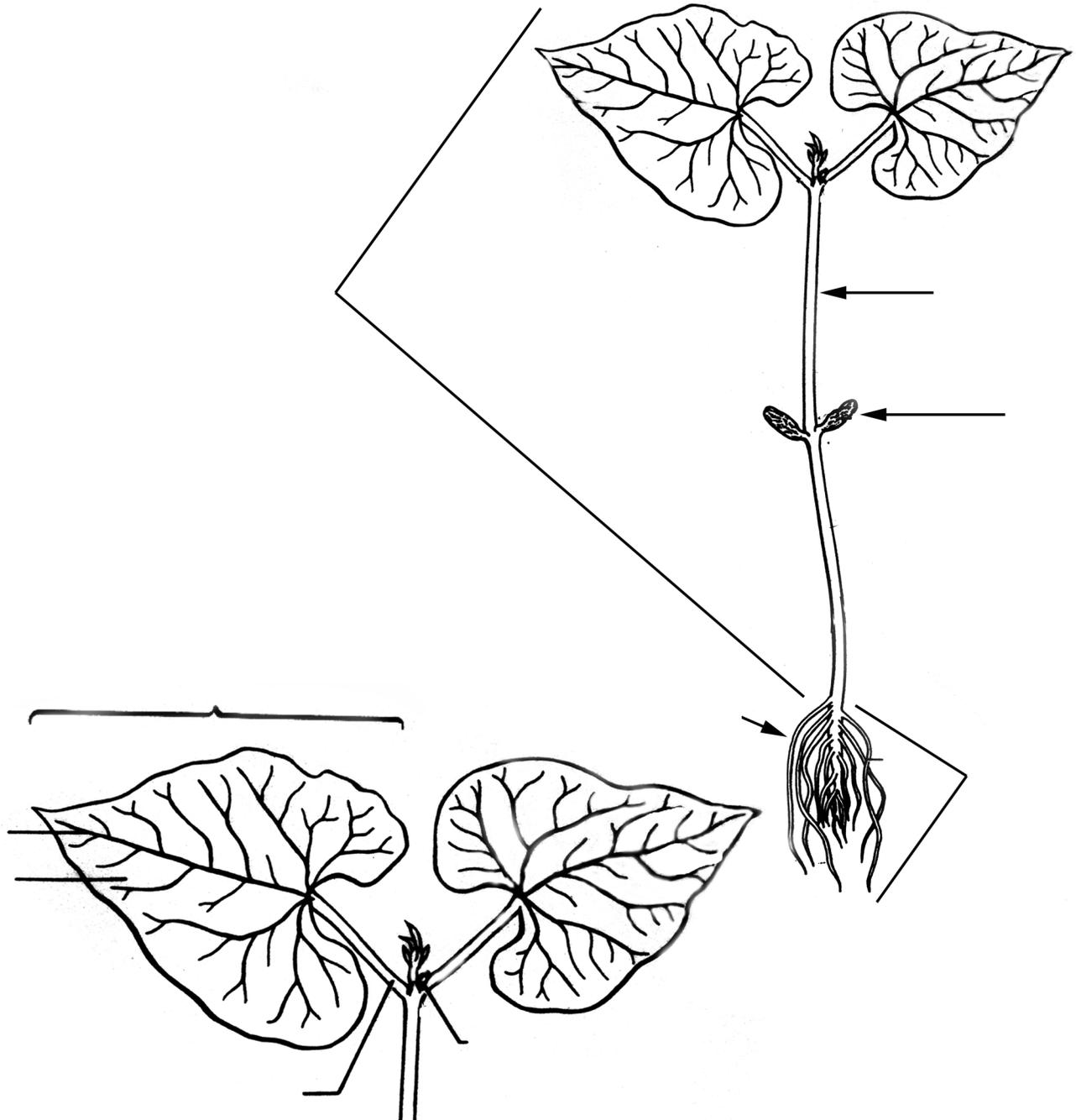
opposite
alternate
whorled
leaf scar

- I. At the demonstration bench and carefully uproot a seedling. At your seat, study the plant for about five minutes. Try to associate as many of the terms listed as possible. Then, with the help of your teaching assistant, label the figures.

Axillary Bud
Petiole
Stem
Stipule

Blade
Root
Vein
Cotyledon

Root System
Shoot System
Leaf



II. Examples of Other Plants. Around the room are examples of plants with the following characteristics:

Opposite leaves
Whorled Leaves
Stipules

Alternate leaves
Compound Leaves

Draw an example of each character below:

View of leaf, and stem with an axillary bud
(label node and internode)

A compound leaf
(include a axillary bud)

Opposite leaves

Alternate leaves

Whorled leaves

**Stipule of *Hibiscus*
or *Geranium***

III. Morphology of a Woody Twig

Go to the front of the room and remove a sample twig from the bag. Study your twig for a few minutes and consider these questions.

What structure on this twig represents a leaf?

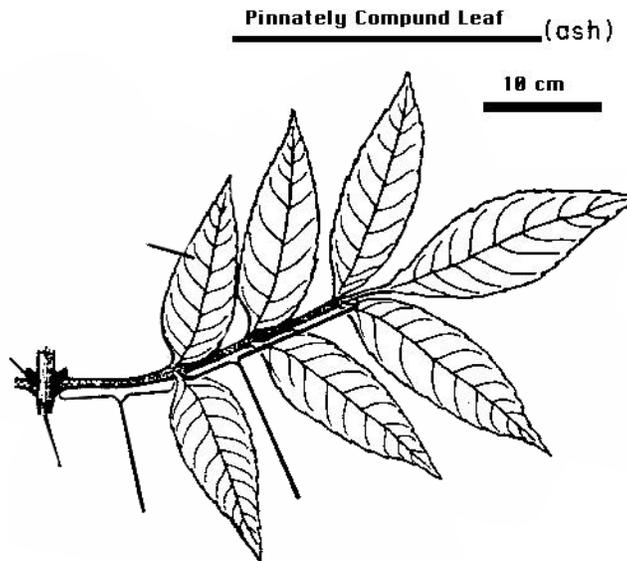
What structure marks the start of the current years growth?

Can you recognize boundaries between the growth of other years?

What structure gives rise to lateral shoots? What is its relationship with a leaf?

With the help of your TA, label the figure with the following terms:

Axillary Bud Leaf Leaflet Petiole Rachis
Stem



IV. Use of a Dichotomous Key

The field guide, *Keys to Selected Native and Cultivated Woody Plants of Madison, Wisconsin*, is a work written by Dr. Robert Kowal an emeritus professor in our department. Effective use of these keys will require applying what you have just learned about plant structure. This key may be downloaded at

http://botit.botany.wisc.edu/botany_130/Laboratory.html

Your TA will demonstrate how to use the tree guide using the twig studied in the last section.

For the rest of your time in lab, work with a partner to identify unknown twigs available in the lab room using the computer based picture version of the field guide while also following through your text-based key. After identifying each unknown, verify your identification with your TA before working with a different unknown.

You will use these keys outside in discussion to identify common trees and shrubs on campus.



Acer negundo - Box Elder



Hickory (*Carya*)
Woody twig showing petioles of
alternately arranged, pinnately compound leaves