

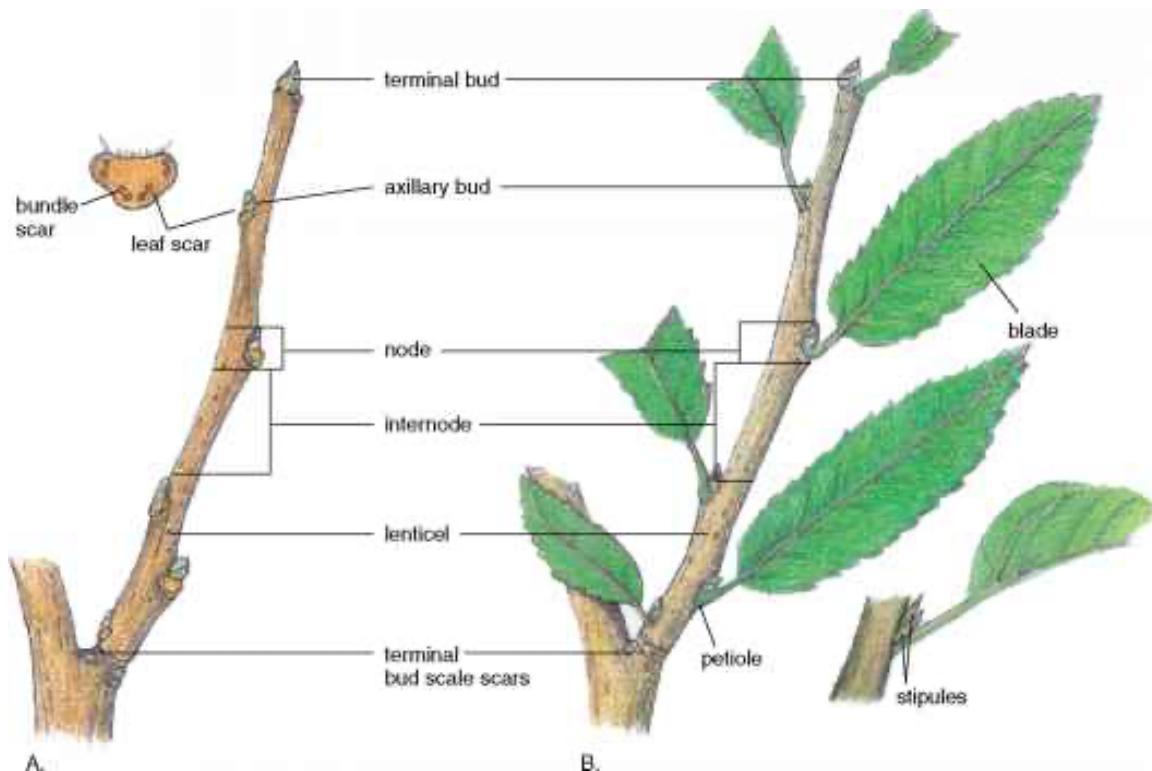
# External Form and Features of Woody Twigs

LArch 245 Fall 2023

compiled by Prof. Ken Tamminga from sources noted

A woody twig consists of an **axis** with attached leaves (see below). If the leaves are attached to the twig alternately or in a spiral around the **stem**, they are said to be **alternate**, or alternately arranged. If the leaves are attached in pairs, they are said to be **opposite**, or oppositely arranged, or if they are in whorls (groups of three or more), their arrangement is **whorled**. The area, or region (not structure), of a stem where a leaf or leaves are attached is called a **node**, and a stem region between nodes is called an **internode**. A leaf usually has a flattened **blade**, and in most cases is attached to the twig by a stalk called the **petiole**.

Each angle between a petiole and the stem contains a **bud**. The angle is called an **axil**, and the bud located in the axil is an **axillary bud**. Axillary buds may become branches, or they may contain tissues that will develop into the next season's flowers. Most buds are protected by one to several **bud scales**, which fall off when the bud tissue starts to grow.

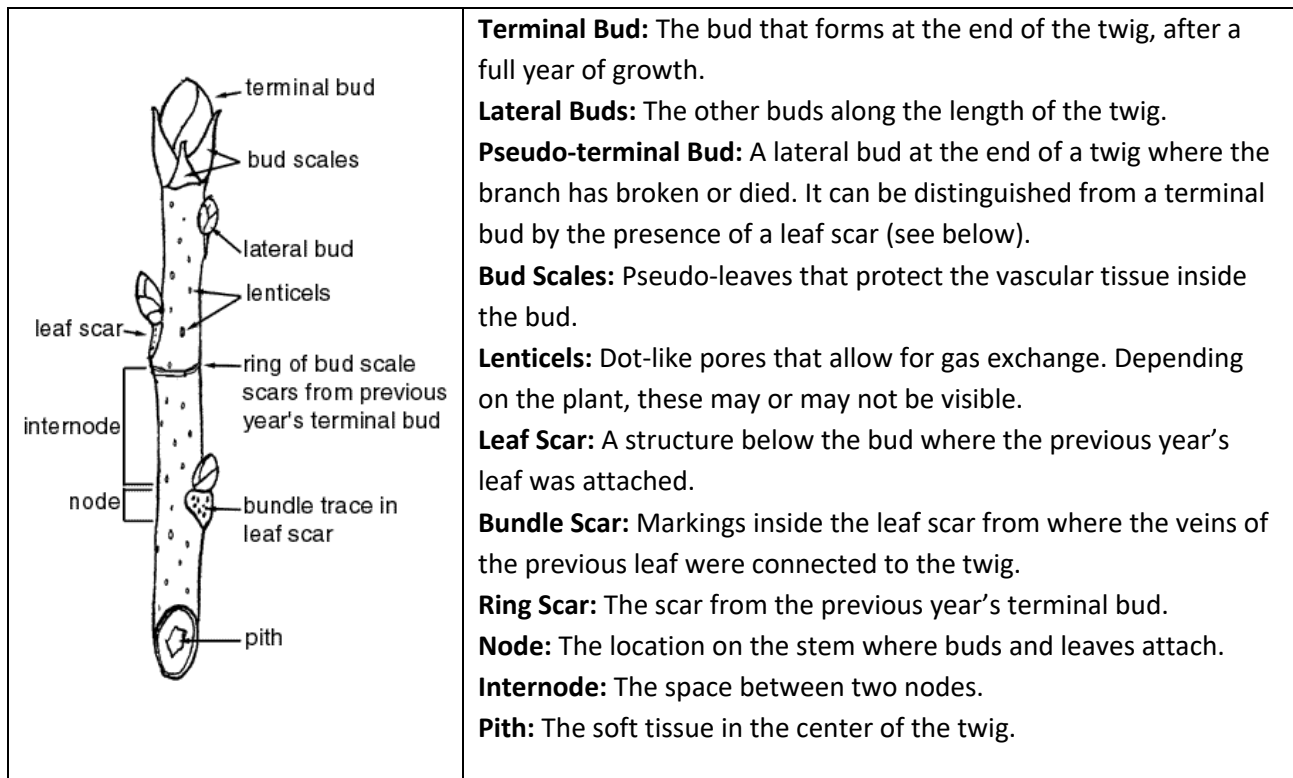


## Woody Twig

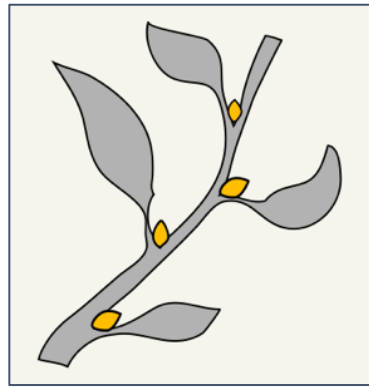
A. twig in winter condition

B. twig the summer before

Here is another graphic on the parts of a twig:



Usually, a **terminal bud** is present at the tip of each twig. A terminal bud usually resembles an **axillary bud**, although it is often a little larger. Unlike axillary buds, terminal buds do not become separate branches, but, instead, the meristems within them normally produce tissues that make the twig grow longer during the growing season. The **bud scales** of a terminal bud leave tiny **scars** around the twig when they fall off in the spring. Counting the number of groups of bud scale scars on a twig can tell one how old the twig is. Sometimes other scars of different origin also occur on a twig. These scars come from a leaf that has **stipules** at the base of the petiole. Stipules are paired, often somewhat leaflike, appendages that may remain throughout the life of the leaf. In some plants, they fall off as the buds expand in the spring, leaving tiny **stipule scars**. The stipule scars may resemble a fine line encircling the twig, or they may be very inconspicuous small scars on either side of the **petiole** base.



Axillary Buds

Deciduous trees and shrubs (those that lose all their leaves annually) characteristically have **dormant axillary buds** with **leaf scars** left below them after the leaves fall. Tiny **bundle scars**, which mark the location of the water-conducting and food-conducting tissues, are usually visible within the leaf scars. There may be one to many bundle scars present, but more often than not, there are three. The shape and size of the leaf scars and the arrangement and numbers of the bundle scars are characteristic for each species. One can often identify a woody plant in its winter condition by means of scars and buds.

### More Definitions

Woody Twig Exteriors—

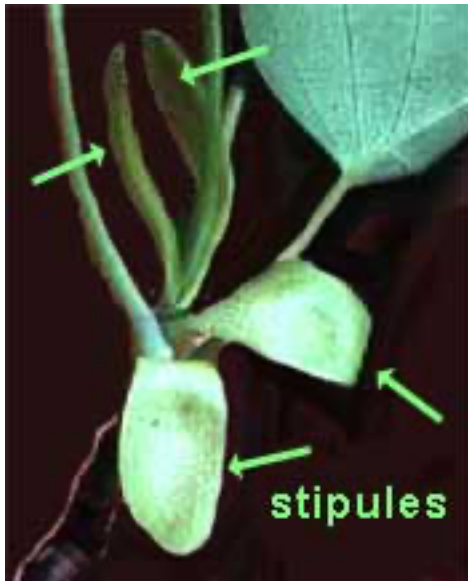
The White mulberry twig example below shows an oval bud in the **axil** formed where a leaf's green **petiole** (its "stem") connects with the gray-brown twig. Each tree species has its own unique kind of bud. On the left, notice the light-colored bumps scattered all along the twig. They are **lenticels**, which allow interchange of gases between the twig's internal tissue and the atmosphere.



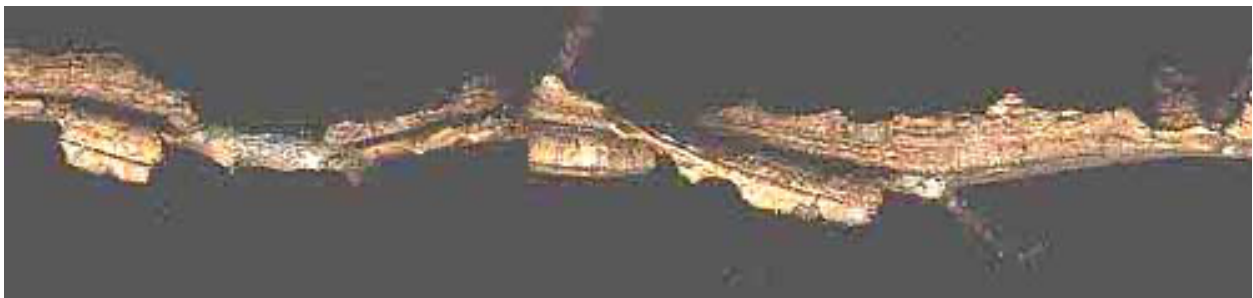
Lenticels help the tree to breathe. Different twigs also have different kinds of lenticels. In the picture to the right, you can see a thin, horizontal ridge at the base of the scar, extending about two-thirds of the distance across the twig's diameter. That's a **stipular scar**; some tree species have them, and some don't. Stipular scars are important in twig identification. Sycamores and members of the Magnolia Family have **stipular rings** – scars completely encircling the stem. The picture above shows stipular rings on a Sycamore twig, as well as the brown, shriveling **stipule**, right before it drops off, leaving a stipular ring at its base.

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Here you can see a Tulip poplar's large stipules. These will all fall off, leaving scars. Stipules protect leaves and stems when they are very small, not yet unfolded. Once the leaf or stem is mature, the stipules are no longer needed, so they fall off.



Some twigs have weird adaptations you'd never expect them to have. For example, below, on the twig of a Sweetgum tree from next to my trailer, you can see that sometimes twigs bear brown "corky ridges" or "wings." No one is sure why some twigs have wings such as these, but several species do. Maybe they just make it harder for leaf-chewing caterpillars to travel from leaf to leaf, or maybe they help twigs dissipate heat, or hold heat.



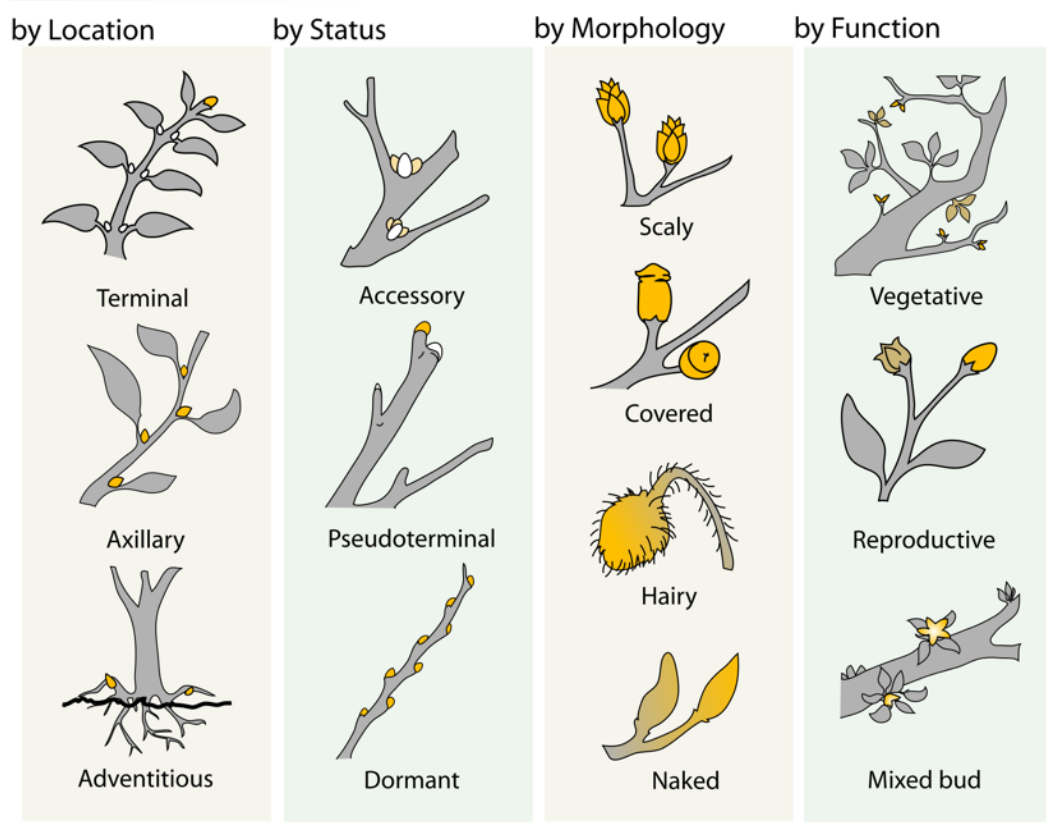
Whatever their reason to exist, such features help you identify trees even without flowers, fruit and leaves.

### Buds—

In botany, a **bud** is an undeveloped or embryonic shoot and normally occurs in the axil of a leaf or at the tip of a stem. Once formed, a bud may remain for some time in a dormant condition, or it may form a shoot immediately. Buds may be specialized to develop flowers or short shoots, or may have the potential for general shoot development.

When located at the tip of a stem, buds are called “**terminal buds.**” The term “**apical bud**” is equivalent but is reserved for the one at the top of the plant.

### Types of Buds



Types of Buds

### Meristem—

A **meristem** is the tissue in most plants containing undifferentiated cells (**meristematic cells**), found in zones of the plant where growth can take place. Meristematic cells give rise to various organs of a plant and are responsible for growth. **Apical meristems** are located at the tips of buds and stems. **Lateral meristems** are the **cambium** in which secondary growth occurs, resulting in increase in stem girth.

### Bud scar—

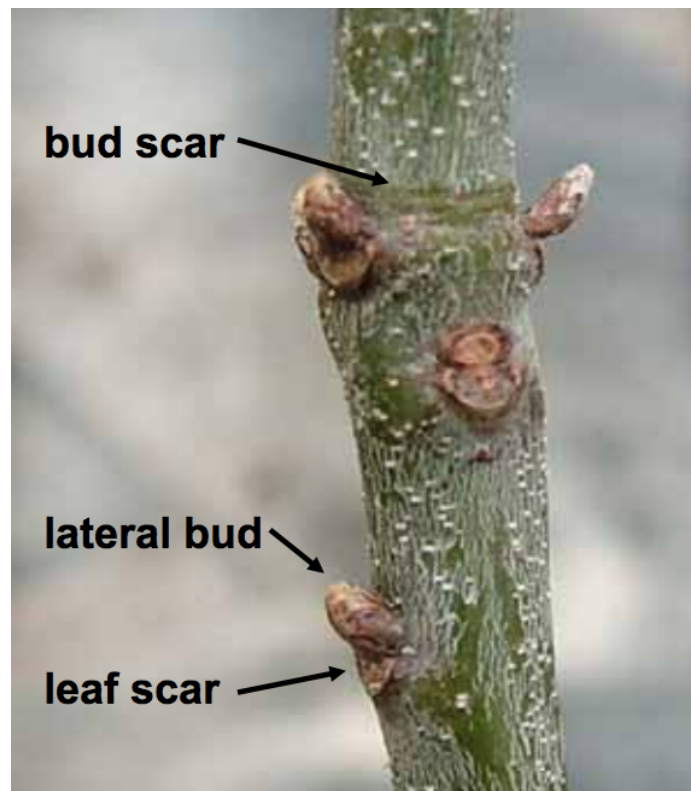
As a **terminal bud** bursts forth with new growth, a **protective scale** normally falls away, leaving a **bud scar**. Bud scars look like rings around stems and branches of trees and other woody plants. Bud scars are from the terminal bud on a stem. These marks are different from leaf scars. Leaf scars occur at the point of attachment for a leaf, after the leaf has fallen off. Just above a leaf scar, there is usually a **lateral bud** that can grow into a twig or flower.

### Bud scale—

The buds of many woody plants, especially in temperate or cold climates, are protected by a covering of modified leaves called **scales** which tightly enclose the more delicate parts of the bud. Many **bud scales** are covered by a gummy substance which serves as added protection. When the bud develops, the scales may enlarge somewhat but usually just drop off, leaving a series of horizontally-elongated scars on the surface of the growing stem.

### Stipule—

Refers to outgrowths borne on either side (sometimes just one side) of the base of a leafstalk, the petiole. A pair of stipules is considered part of the anatomy of the leaf of a typical flowering plant, although in many species the stipules are inconspicuous or entirely absent.



## Sources

<https://en.wikipedia.org/wiki/Bud>

<https://en.wikipedia.org/wiki/Meristem>

<https://www.78stepshealth.us/flowering-plants/external-form-of-a-woody-twig.html>

<https://biologydictionary.net/apical-meristem/>

<https://www.thedailygarden.us/garden-word-of-the-day/bud-scars>