# Stem Anatomy

# Stem Anatomy

- What are the functions of a stem?

# Stem Anatomy

- Stems have many important jobs in a plant.
- Stems are responsible for the size and shape of a plant.
- Some stems are made of wood, and some are herbaceous or soft.

# Stem Anatomy

- The following are four functions of stems.

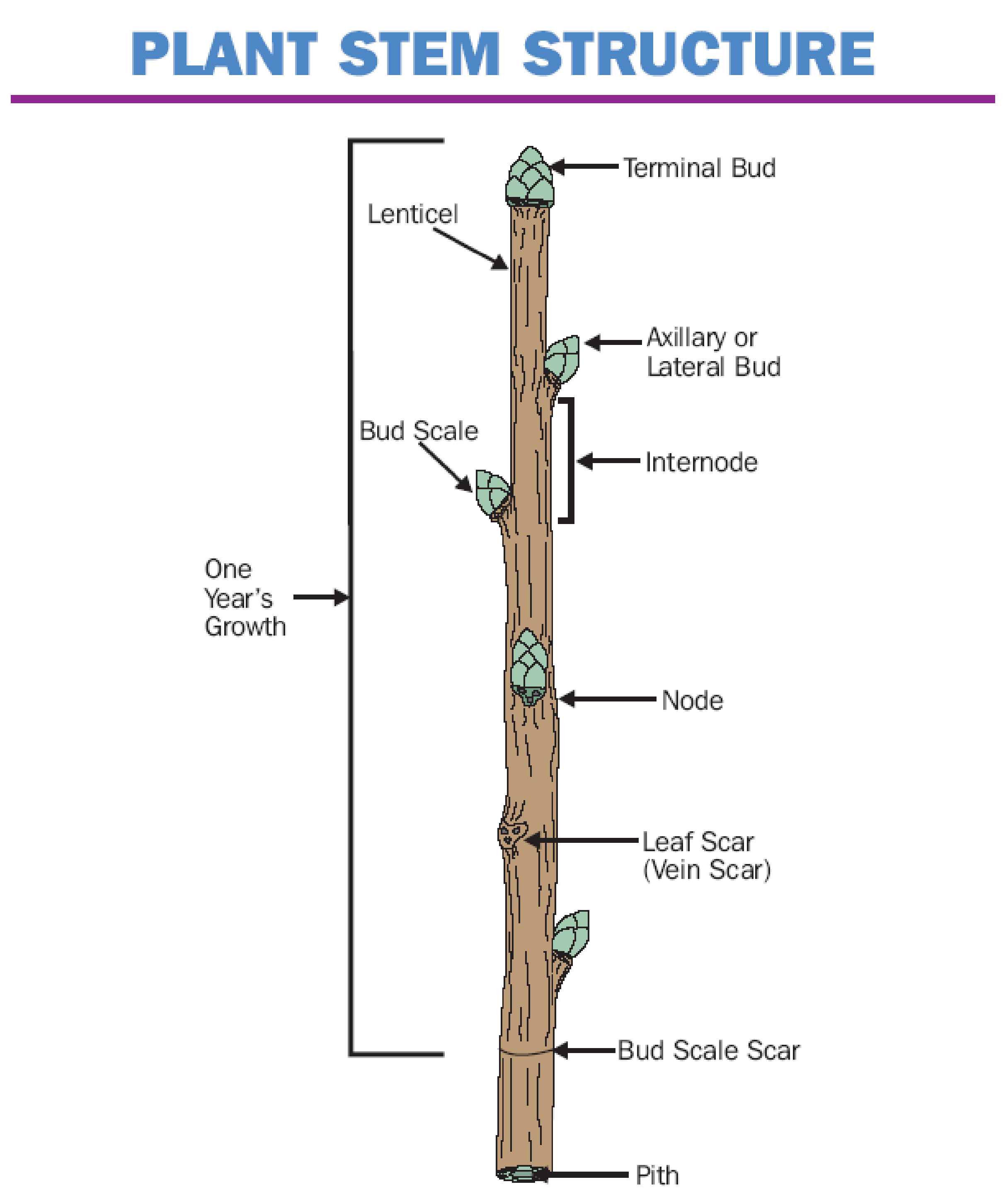
1. Stems support the leaves. They hold the leaves in the most efficient position to collect sunlight.
2. Stems move water, minerals, and manufactured food throughout the whole plant. The movement of materials through vascular tissues is known as ***translocation***.

## Stem Anatomy

3. Stems that are green in color help produce food through photosynthesis. While this is not usually the primary food production, it can be quite important in plants with no leaves or very small leaves.

4. Stems store food that has been manufactured by the plant.

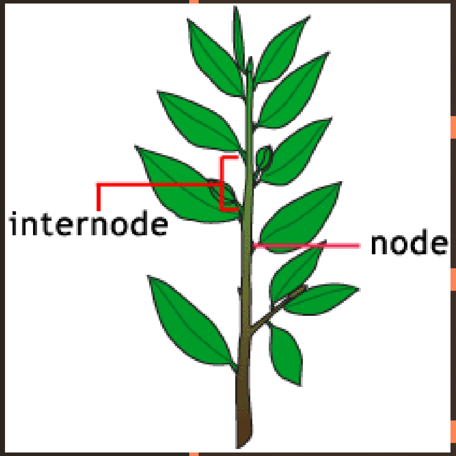
# Stem Anatomy

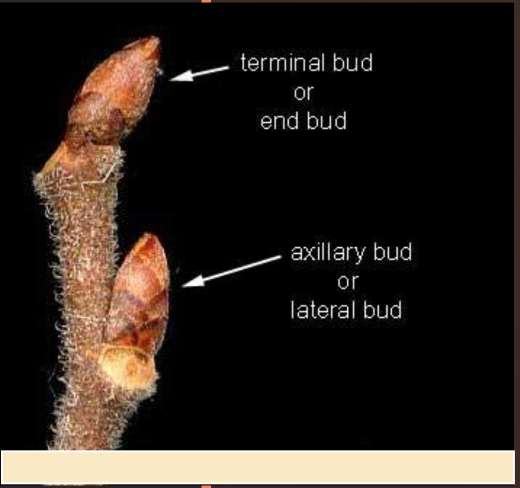


# Stem Anatomy

- Many structures on the stem are useful to us in identifying plants.
- The following are some ***external*** structures on a stem.
  - The growing point at the tip of the stem, called the ***apical meristem,*** is contained inside of the ***bud*** at the end of the stem, which is called the ***terminal bud***.
  - The apical meristem is the same type of structure that the tip of the root has and is responsible for growth in the length of the plant.

# Stem Anatomy




- The leaf is attached to the stem at the ***node***.
- The area between leaves is called an ***internode***.
- At the node, just above where the leaf is attached, there is always a side bud called the ***lateral bud***.

On the outside of both terminal and lateral buds are small protective structures called ***bud scales***.

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- When the leaf falls off of the stem, it leaves behind a small scar just below the lateral bud.
  - This scar is called the ***leaf scar***.
- When the buds sprout each spring, the bud scales fall off, leaving behind a ring of scars called the ***bud scale scar***.
- The distance between bud scale scars represents one year's growth of the stem.
- ***Lenticels*** are small spots on the stem that allow it to exchange gases with its environment.

# Stem Anatomy

- Inside of the stem, there are tissues used to transport materials throughout the plant.
- Stem tissues are organized in one of the following ways.
  - The important vascular tissues are either found in small bundles scattered throughout the stem or arranged in rings or a ring of vascular bundles, which are located in the ***cortex***.
    - The cortex is the outer portion of the stem.

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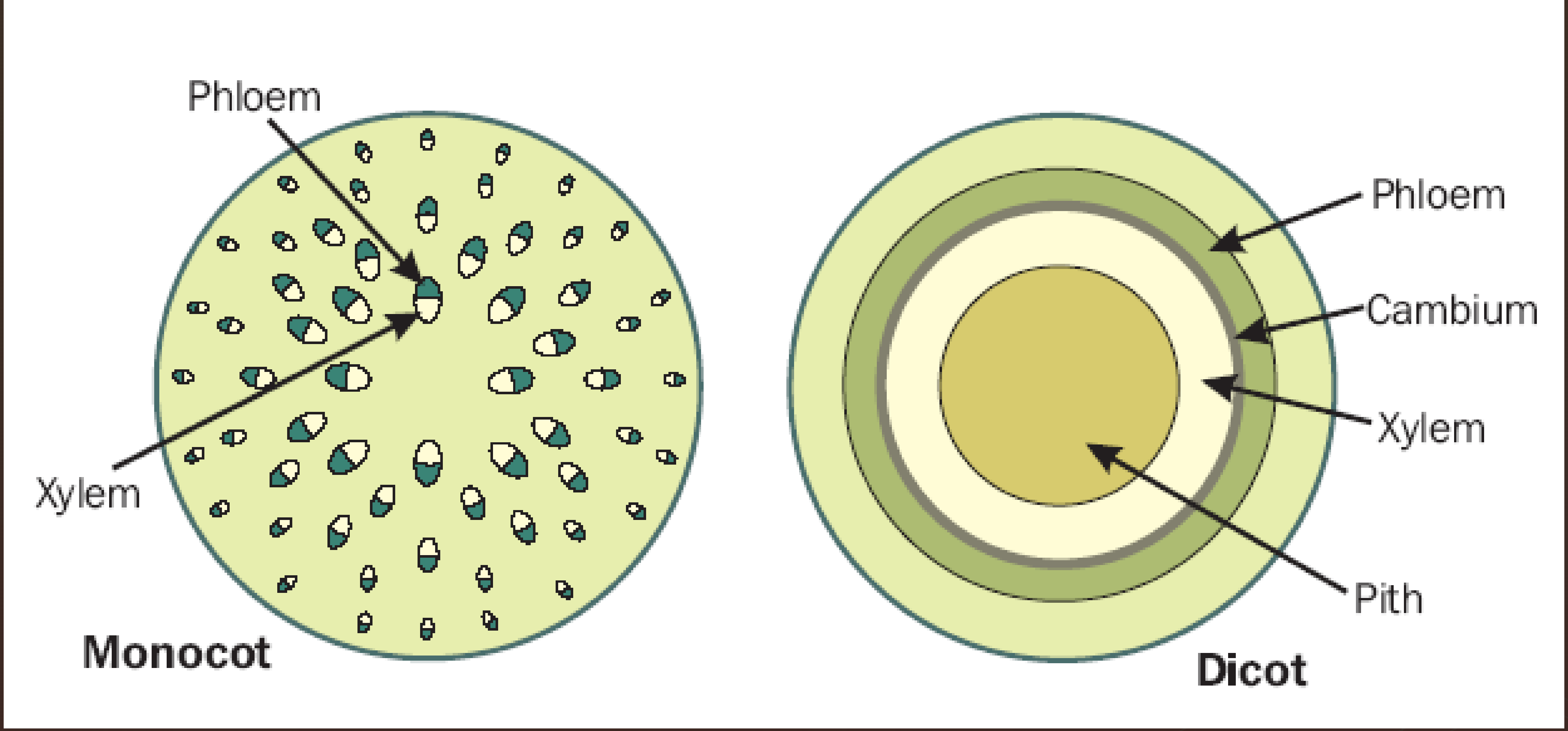
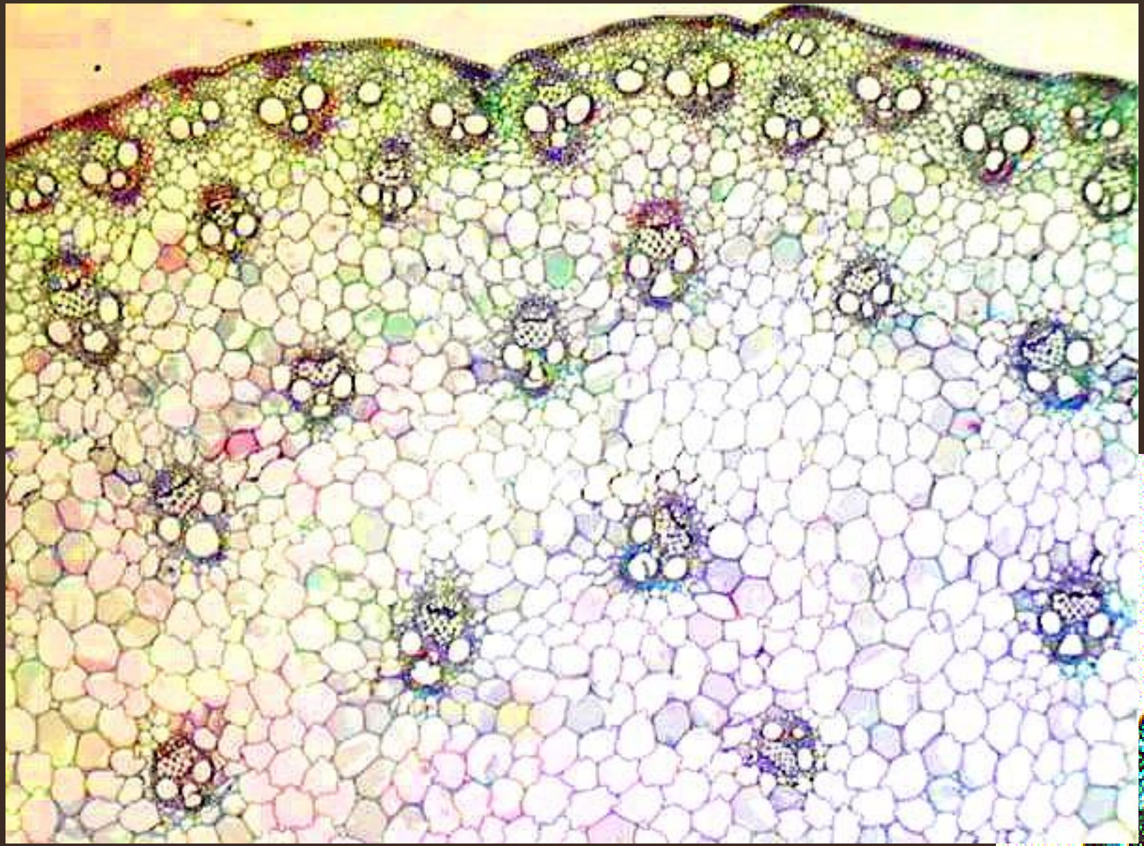
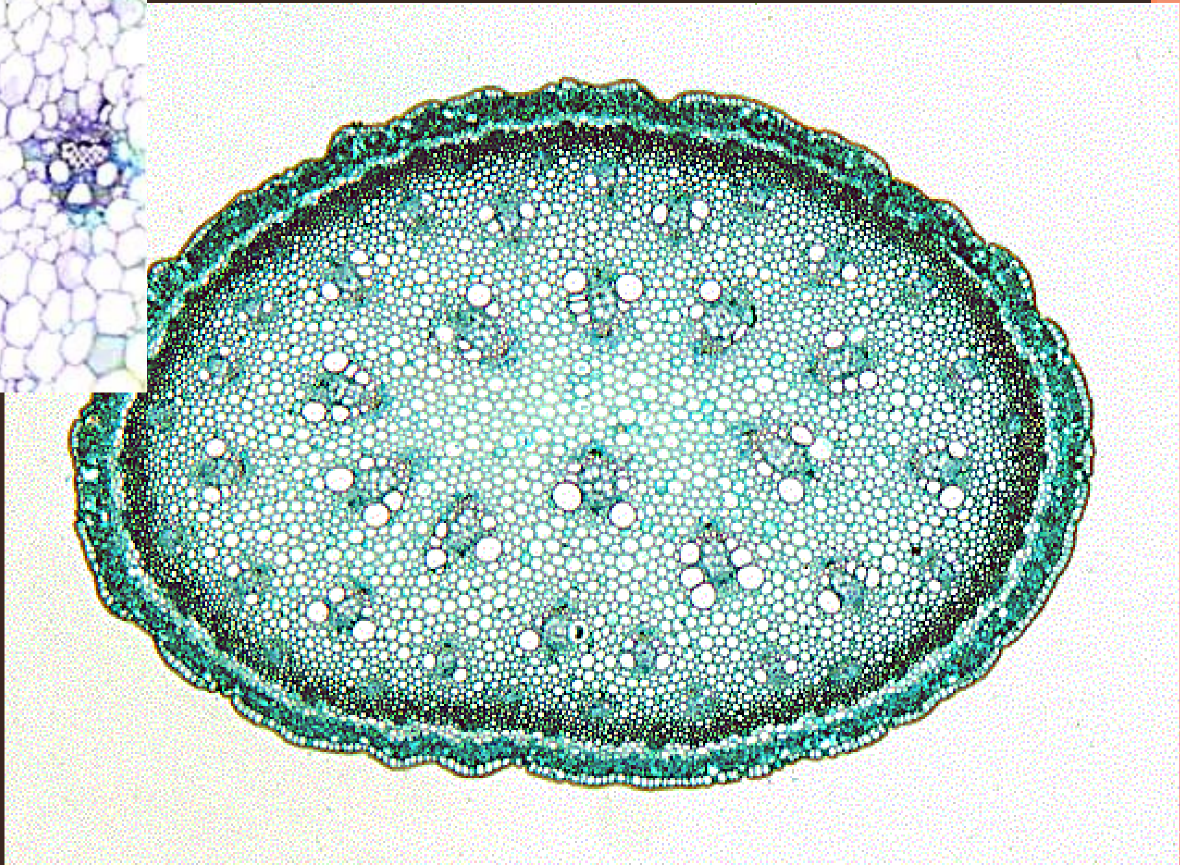
- The first way, scattered bundles, is found in monocots.
- The second way, in rings, is found in dicots.
- There are three important types of tissue found inside of the stem.

# Stem Anatomy

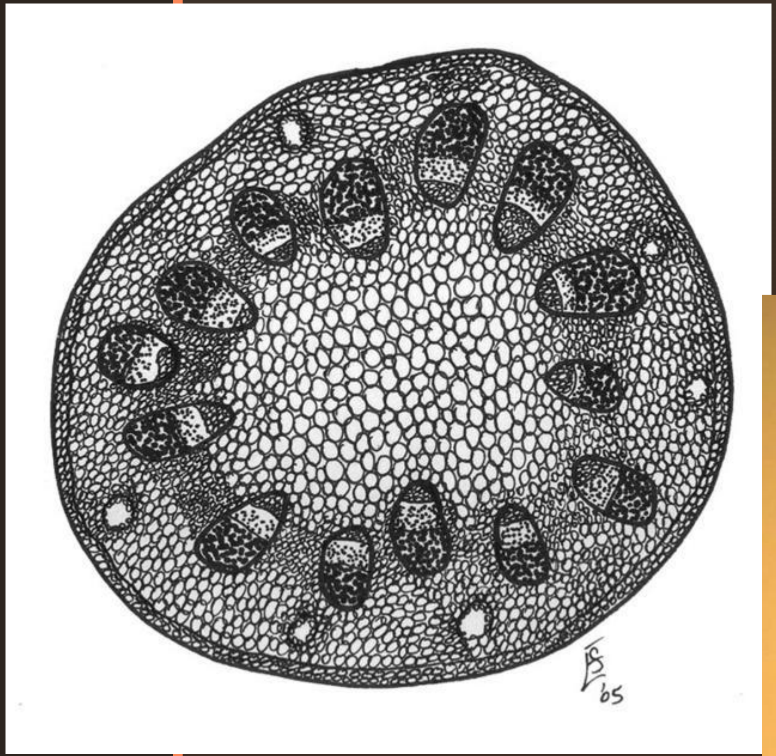


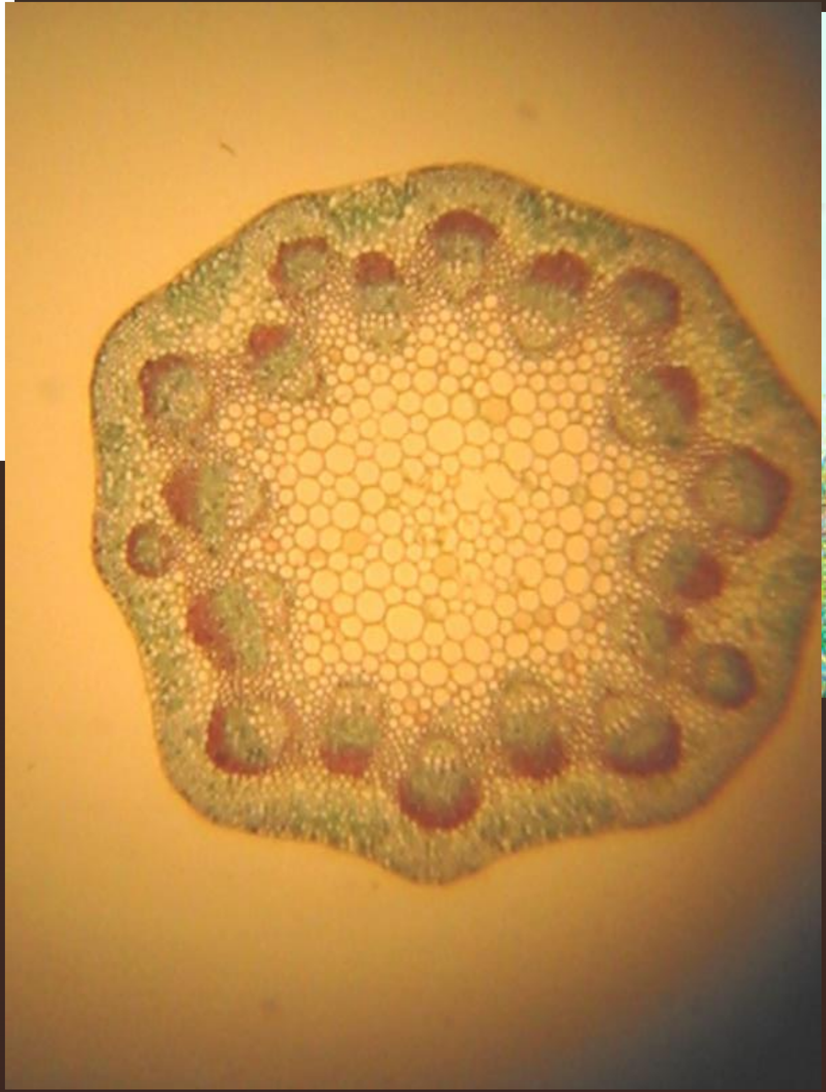
# Monocots

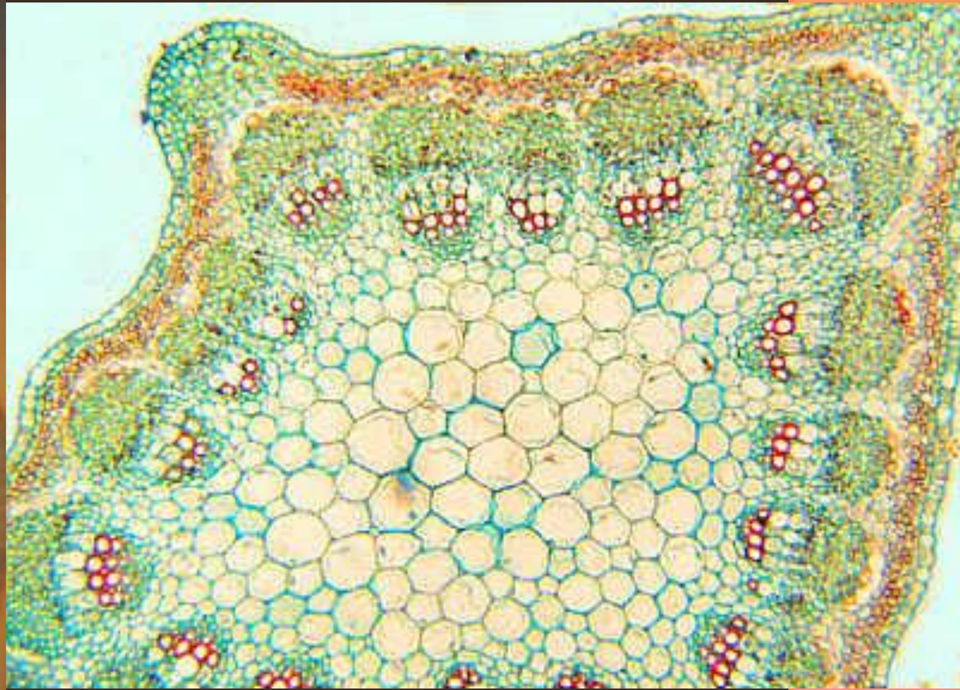




# Dicots







## Stem Anatomy

- The ***xylem*** is tissue that conducts the water and minerals throughout the plant.
- The xylem is made of tube-like cells that grow together to conduct liquids.
- Xylem tends to be found closer to the center of the stem.

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- The ***phloem*** is tissue that conducts food that is produced in the leaf to the rest of the plant.
- Phloem cells also form tubes.
- Phloem is generally found toward the outside of the stem

## Stem Anatomy

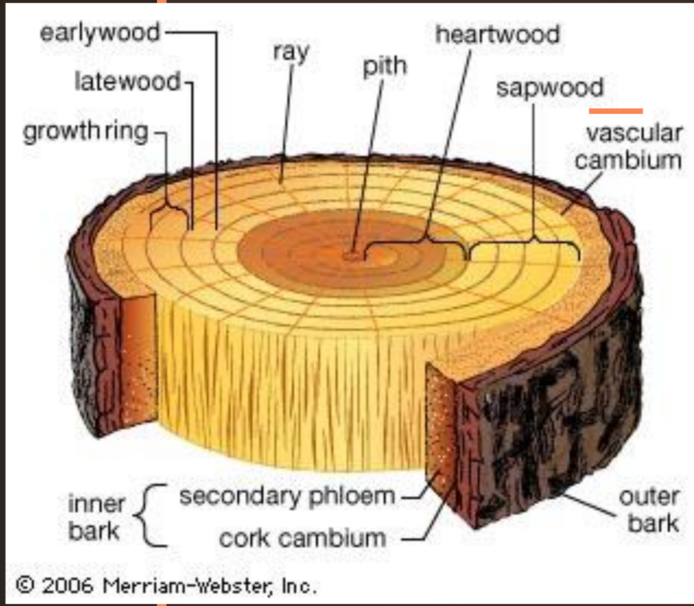
- ***Vascular cambium*** is tissue that is responsible for the production of new xylem and phloem.
- It is responsible for growth in girth of the stem and is generally found between the xylem and the phloem.

# Stem Anatomy

- The darker wood to the center of the tree is called the ***heartwood***.
  - The xylem cells of the heartwood filled with gums, resins, pigments, and tannins.
  - They provide strength and no longer function in conducting materials.

# Stem Anatomy

- The lighter wood circling the heartwood is called the ***sapwood***.
  - The younger sapwood actively conducts water and dissolved minerals.




- The very center of the tree is known as the **pith**.

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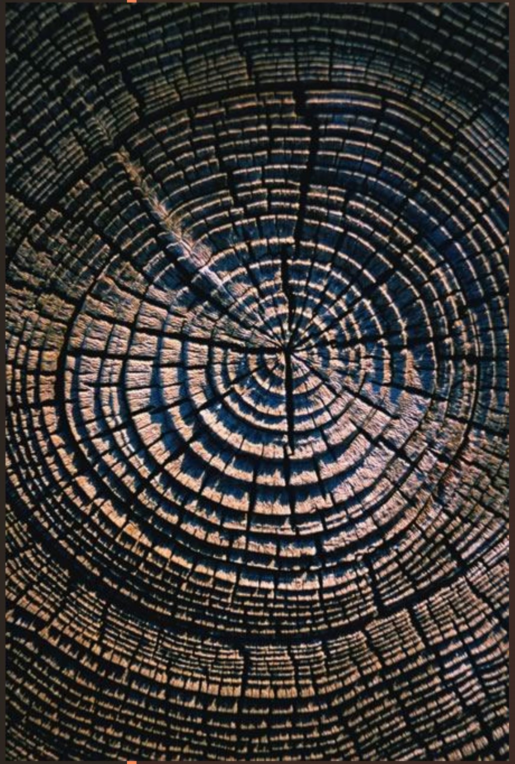

- The age of a tree can be determined by counting annual growth rings.
- During rapid growth, the cells of the wood are thin walled and large in diameter.

As growth slows during mid-to-late summer, the wood cells produced by the cambium become smaller and have thicker walls.

Each ring is the growth during one growing season.