

Tree Care Workshop

Understanding the Growth Habits of Landscape Trees

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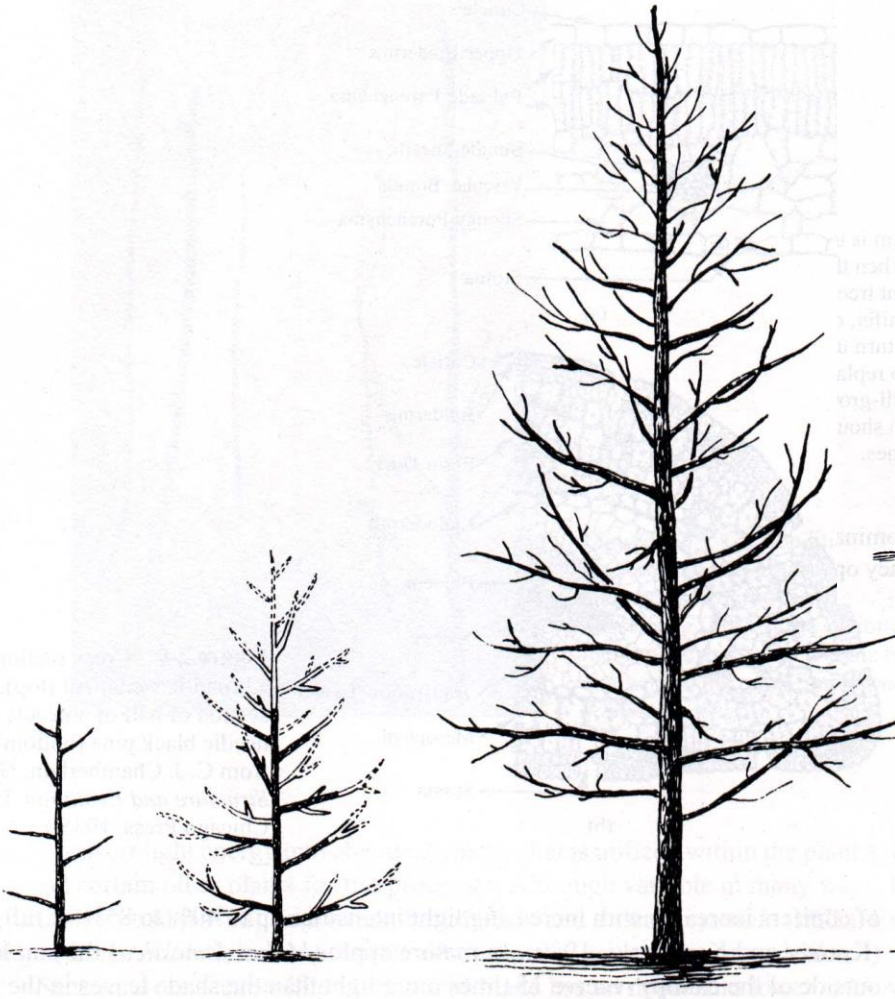


Tree growth

- From seed or cutting to mature plant
- Growth is genetically determined
- Influenced by environmental conditions



Excurrent



Decurrent



Deciduous

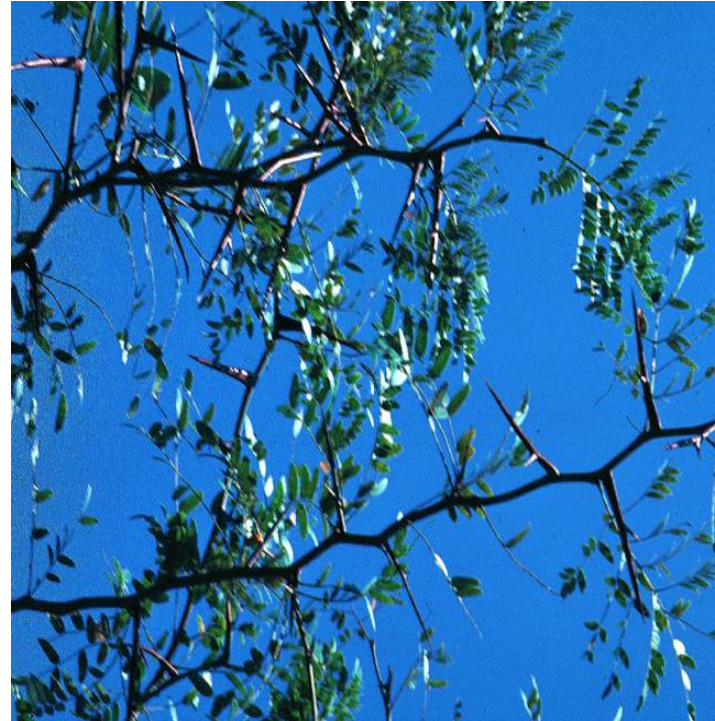
Plants that shed their leaves every year

Evergreen

Plants hold their leaves for more than a year, green year-round.

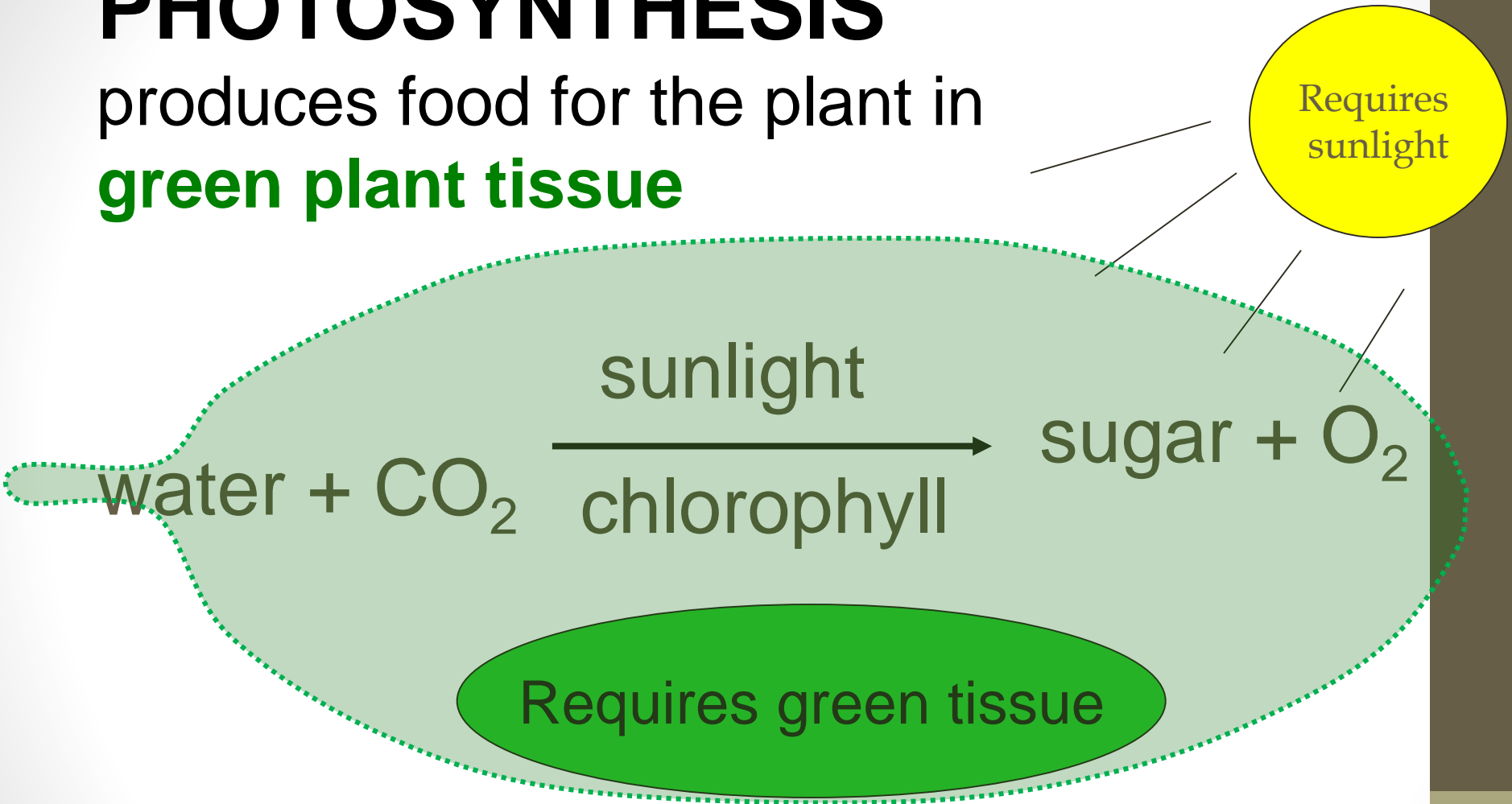
Leaves

1. Capture and conserve light energy through the process of **photosynthesis**.
2. Take up carbon dioxide for photosynthesis and release oxygen for use in **cellular respiration**.
3. Store conserved energy in “food” molecules --**sucrose and starch**.
4. Control water use and leaf temperature through **transpiration**.



PHOTOSYNTHESIS

produces food for the plant in
green plant tissue



RESPIRATION

makes energy available
for the plant

No light
required



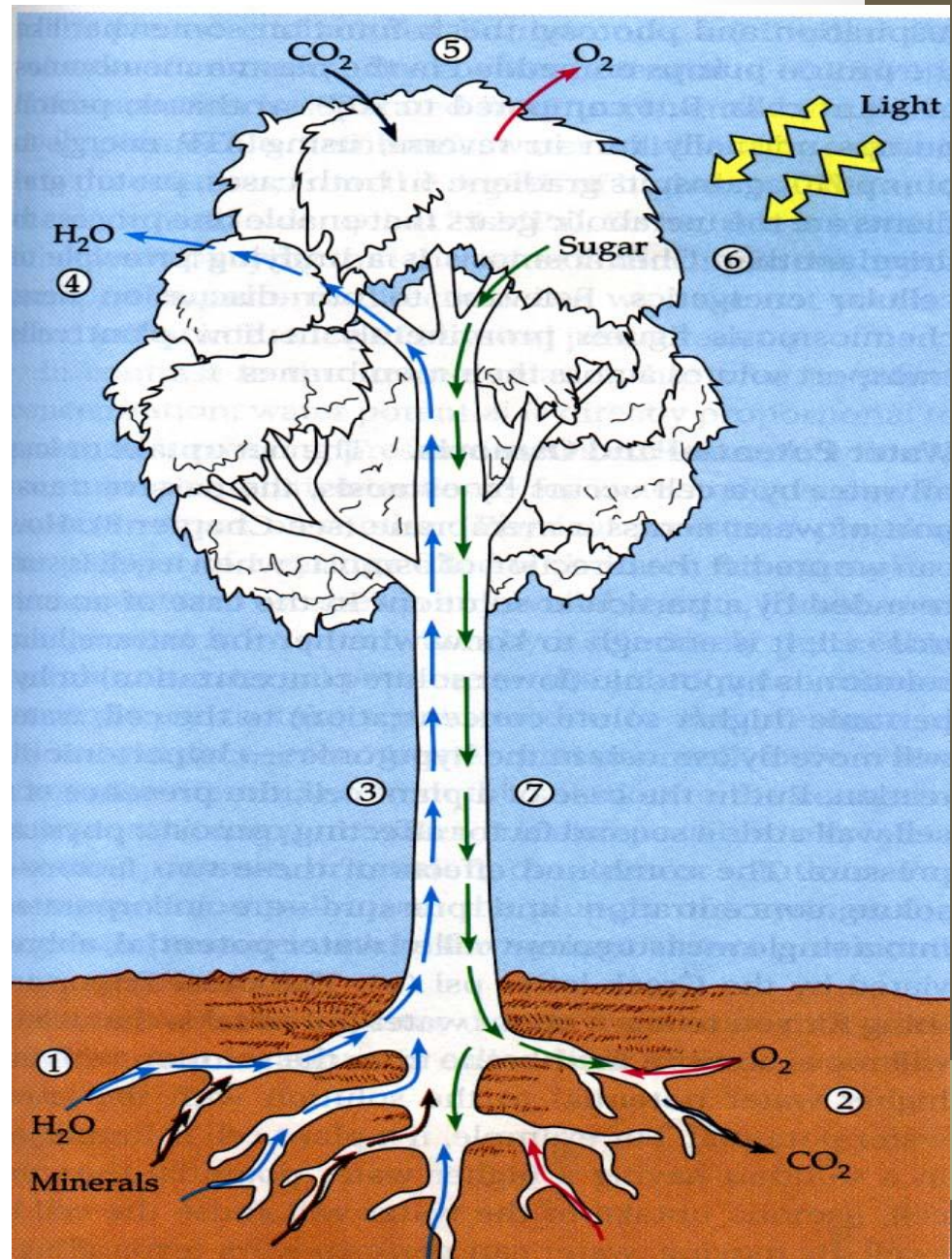
Requires oxygen

Occurs in the
entire plant

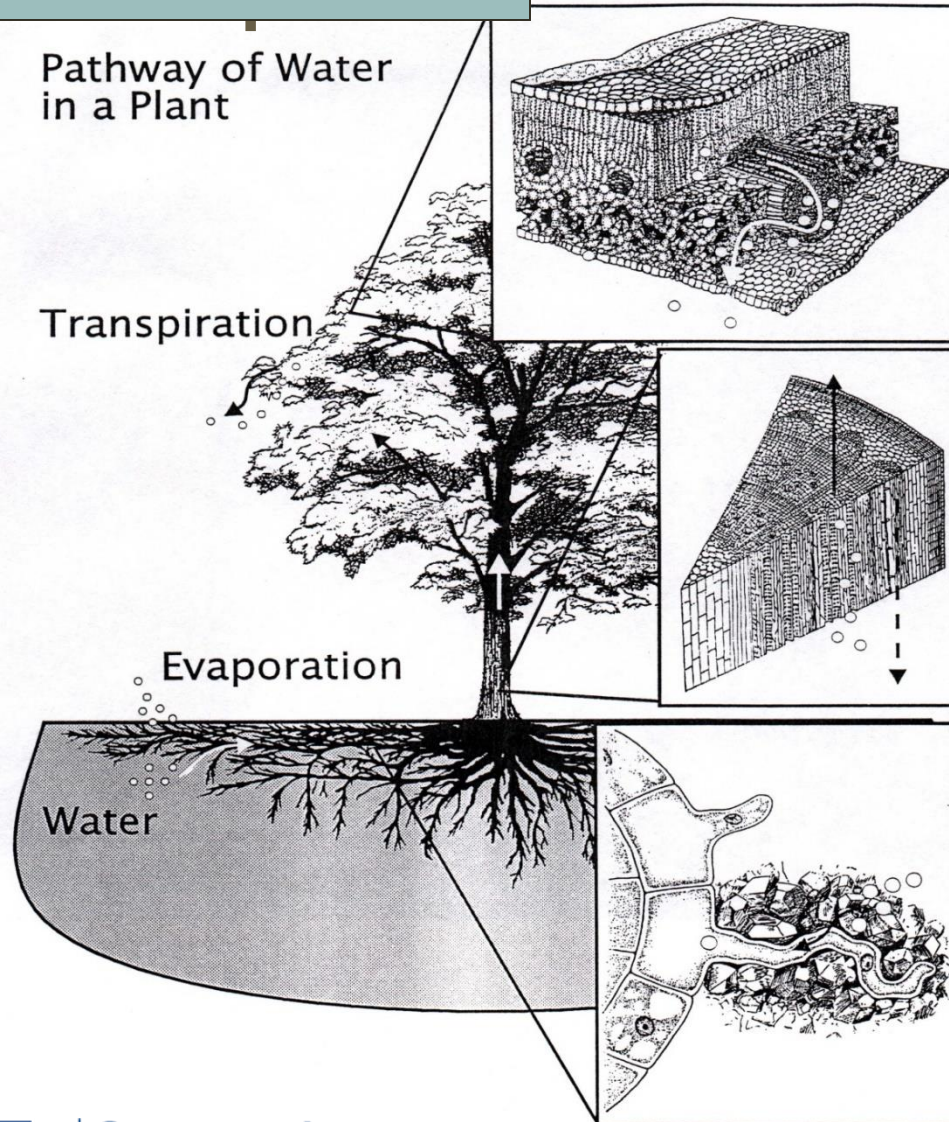
Transport systems in plants

Water and minerals move upward in xylem

Sugars move downward in phloem



Water uptake



Water vapor moves through stomates into the atmosphere

Upward movement through xylem vessels

Uptake through root hairs

Translocation

Transport of soluble organic materials (sugars) from one part of the plant to another.

SOURCE

Leaves



SINKS

young growing shoot tips,
developing flower buds,
elongating roots,
tubers, bulbs, fruit

Translocation

Transport of soluble organic materials (sugars) from one part of the plant to another.

SOURCE

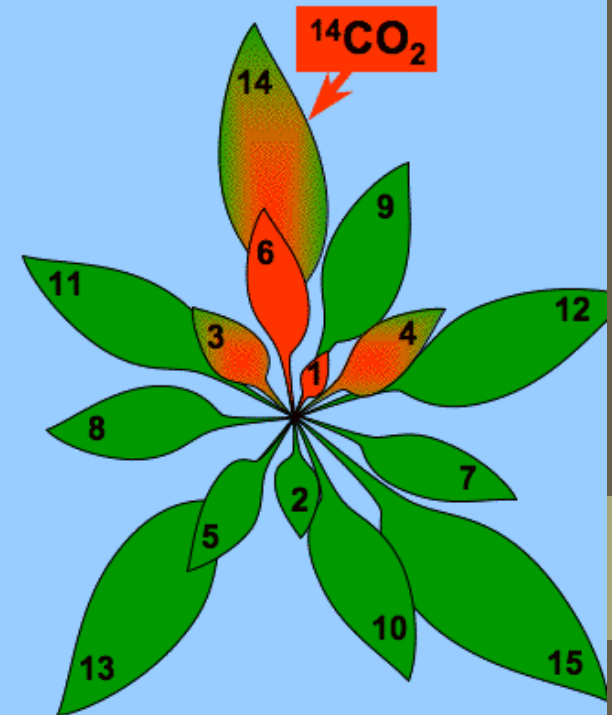
Leaves



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In an intact plant, photosynthate moves to younger leaves immediately above the source leaf.



A Woody Twig

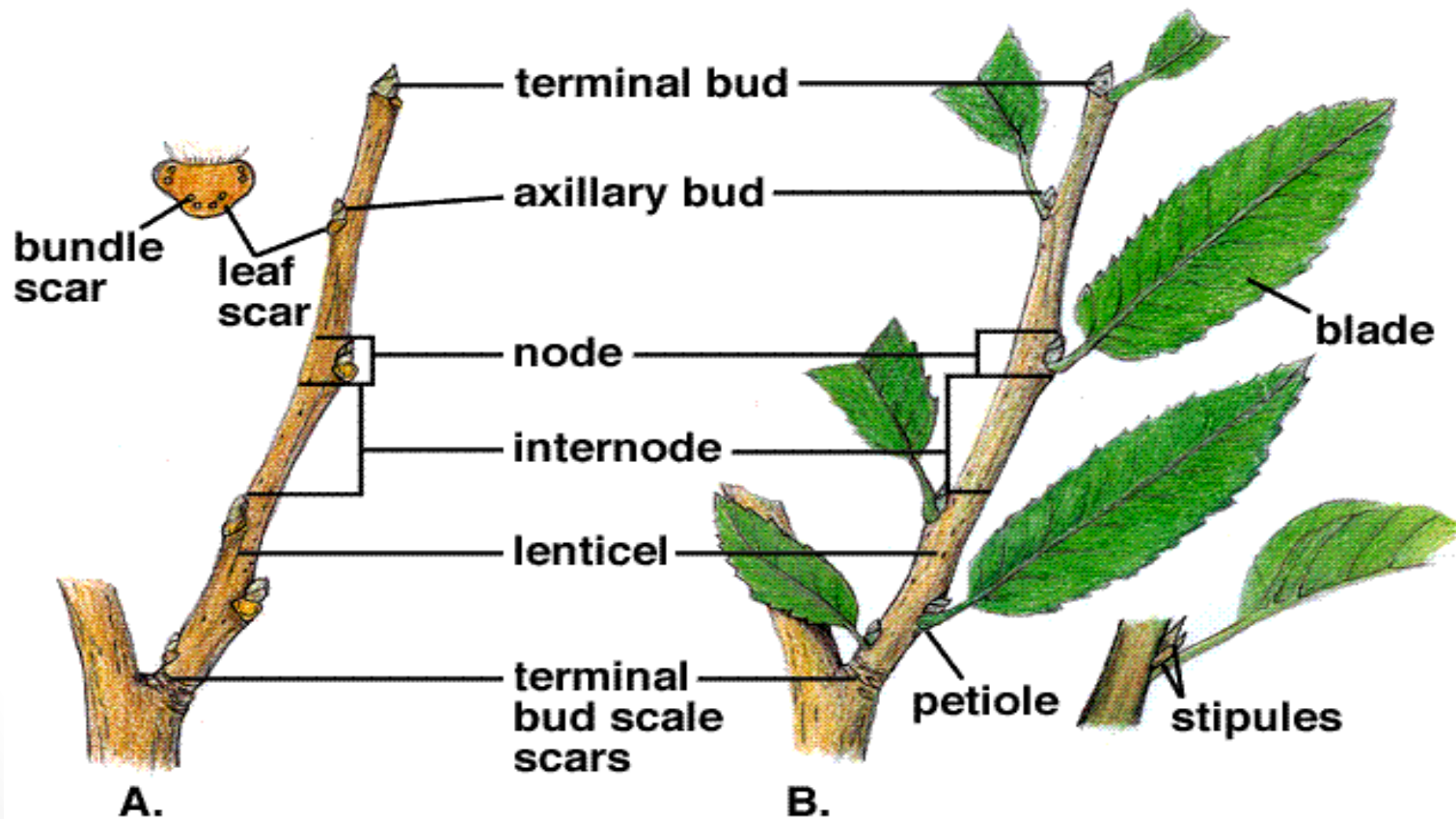


Diagram illustrating the structure of a tree trunk, showing the internal layers and a cross-section of the stem.

The diagram shows a longitudinal section of a tree trunk, revealing the internal structure. The central part is the pith, surrounded by alternating layers of xylem (darker, wood) and cambium (lighter, growth tissue). The outermost layer is the bark. A branch is shown branching off the main trunk. A circular inset labeled "STEM SECTION" shows a cross-section of the stem with labels L (lumen), M (margo), and B (border). Arrows indicate the direction of water transport (upward) and the growth of the stem (outward).

Labels in the diagram include:

- BARK
- BRANCH
- STEM SECTION
- L (lumen)
- M (margo)
- B (border)
- xylem
- cambium
- phloem

The diagram illustrates the vascular system of a tree trunk. The longitudinal section on the left shows the bark, cambium, xylem, and phloem. The cross-section on the right shows the bark, cambium, xylem, and phloem in detail, with labels for active and inactive phloem. A small circular inset shows a root section.

Labels in the longitudinal section:

- BARK
- BRANCH
- xylem
- cambium
- phloem

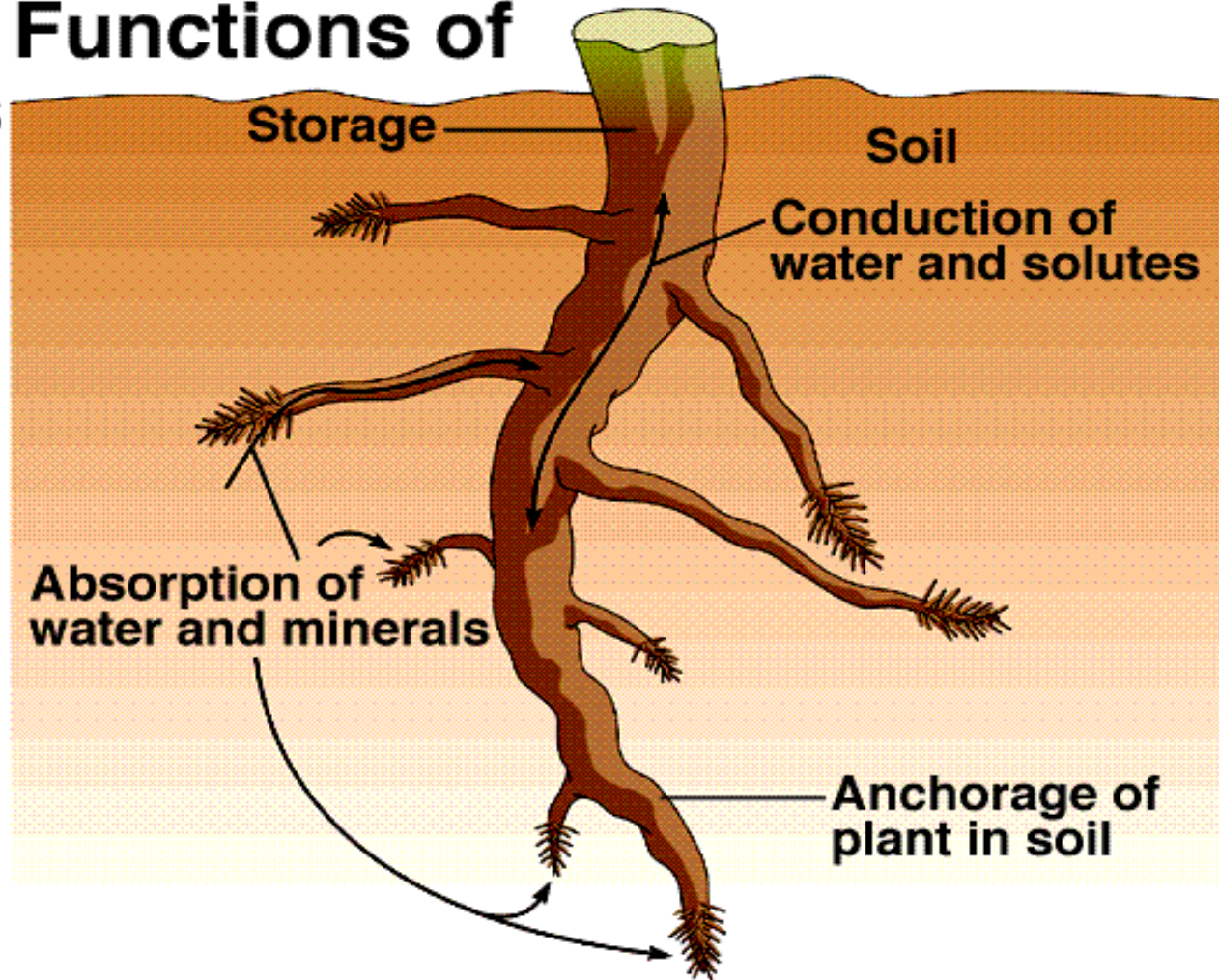
Labels in the cross-section:

- BARK
- ACTIVE PHLOEM
- INACTIVE PHLOEM
- ROOT SECTION

Cambium differentiates into phloem and xylem



Major Functions of Roots





← **Bark**

← **Phloem**

← **Cambium zone**

← **Open vessels,
Conducting sapwood**

← **Non-conducting sapwood**

← **Heartwood**

Last 7 growth increments only
earlywood vessels.
Attacked by gypsy moth for 7 yrs.

***Quercus alba* – White Oak**



Translocation

Transport of soluble organic materials (sugars) from one part of the plant to another.

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**Heat
Drought
Stress**



What happens in stressed trees?

Stress = external factor that prevents optimum plant function

Water stressed plant characteristics:

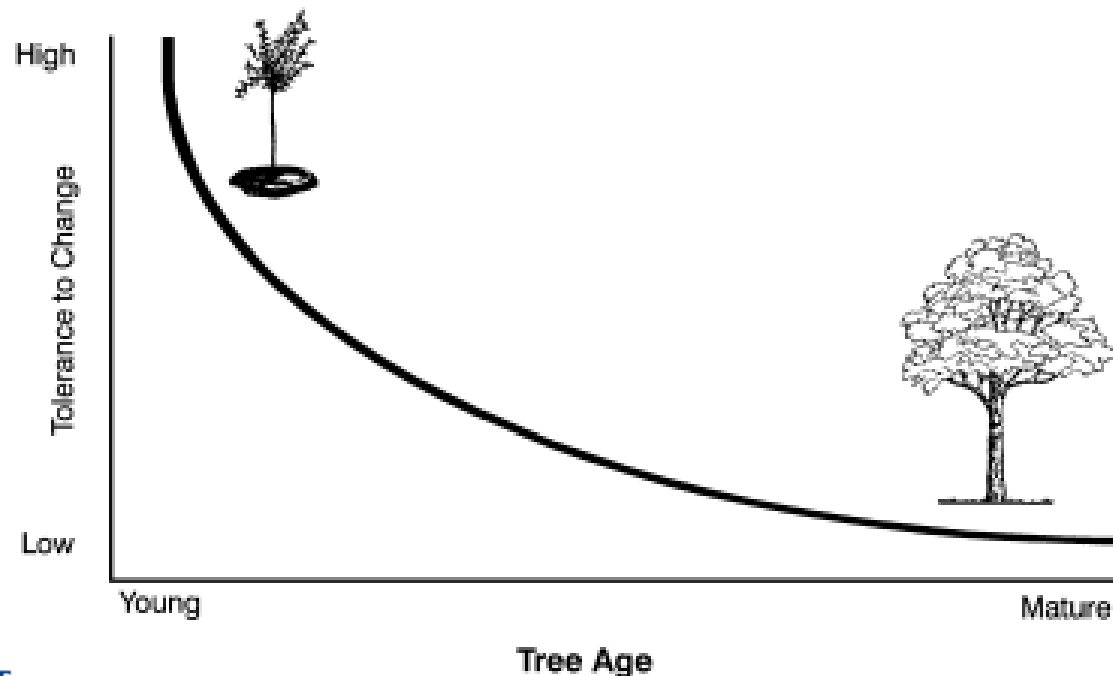
- Leaf expansion is inhibited even at mild stress
- Fewer leaves are produced (reduced new leaf area)
- Leaves shed
- Roots grow more abundant and deeper
- Stomata close in response to abscisic acid
- Photosynthesis slows with increasing stress
- Leaf cuticles become thicker
- Leaves change (wilt, roll)
- **Stressed plants cannot store enough carbohydrates**





As trees mature they can handle less stress or disturbance

- Mature plants are more sensitive to drought, high temperature, soil disturbance, root loss, insects, diseases.



Summary

- Leaf photosynthesis produces the plant's food.
- Respiration throughout the plant and provides energy for growth and defense.
- Meristems are the growing points (buds, cambium)
- Sugars translocate from source to sink
- Stressed trees have less energy, grow less and decline.