

Topic #16

**Transport in Plants**

(Campbell and Reece p. 738-753)

**I. Objectives**

- A. Understand relationship between transport, plant structure, and chemical properties.
- B. Understand why transport in plants evolved this way.

**II. Basic Principles**

- A. “Levels” of Transport

- B. Cell membrane transport

- C. Water potential

- 1. The potential of water LEAVING the solution
- 2. Pure water set at zero.
- 3. More dissolved materials, lower potential of water leaving (negative values – low water potential)



### III. Absorption in Roots.

#### A. Structure.

#### B. Absorption

1. Need contact with water film on soil particles

2. Initial entry by apoplast

3. Must enter symplast

4. After endodermis

#### IV. Transport in Xylem.

A. Sap. =

B. Force needed.

C. Root pressure.

D. Transpiration theory.

1. Evaporation and Sun Energy.

2. Transpiration

3. Increase concentration in mesophyll.

4. Osmosis.

5. Cohesion and pull.

6. Adhesion.

7. Stomata and guard cells.

**V. Guard Cells and Stoma**

A. Stoma need to open

B. Stoma need to close when soil water insufficient to replace transpiration lost

C. Mechanism

## VI. Transport in Phloem.

A. Translocation.

B. Source-sink.

1. Source:

2. Sink:

C. Pressure flow or mass flow hypothesis.

1. Active transport of sucrose into sieve tubes.

2. Mass flow to sink.

## **VII. Summary**

A. Five steps.

1.

2.

3.

4.

5.

## **VIII. Adaptations**

A. Leaf - Photosynthesis, water usage control

B. Xylem - supports height growth

C. Phloem

**IX. Key Terms.**

Water potential

Turgor pressure

tonoplast

cytosol

plasmodesmata

apoplast

symplast

Bulk flow

Absorption

endodermis

*Casparian strip*

Sap

Root pressure

guttation

Evaporation

transpiration

cohesion

adhesion

Stomata

guard cells

Pressure flow hypothesis

Mass flow hypothesis

translocation

source

sink