ADVANCED BIOLOGY: RESOURCE ACQUISITION, NUTRITION, AND TRANSPORT IN VASCULAR PLANTS

(USE CHAPTER 36 and 37 AS A RESOURCE)

ADAPTATIONS FOR ACQUIRING RESOURCES WERE KEY STEPS IN THE EVOLUTIONO F VASCULAR PLANTS

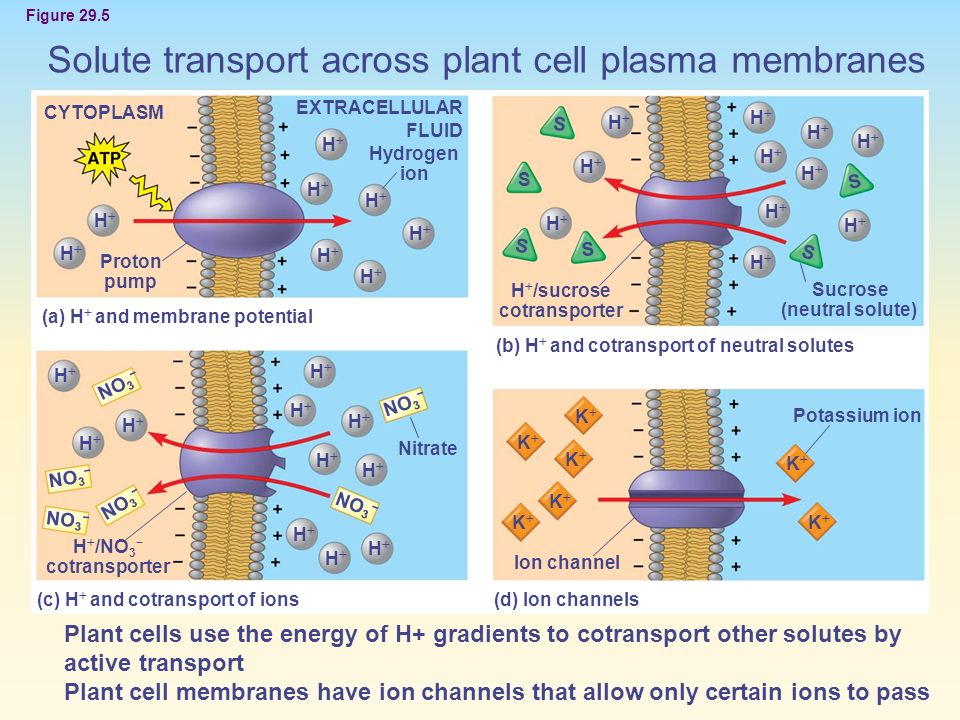
Xylem

Phloem

1. Shoot Architecture and Light Capture
2. Advantages of Height and Branching Patterns
3. Requirements for height
4. Phyllotaxy
5. Canopy
6. Leaf Orientation
7. Root Architecture and Acquisition of Water and Minerals
8. Root growth directionality
9. Mutualistic relationships

DIFFERENT MECHANISMS TRANSPORT SUBSTANCES OVER SHORT OR LONG DISTANCES

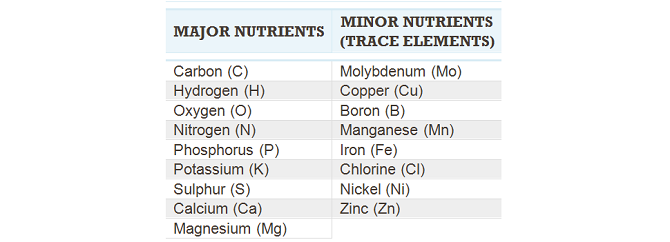
1. The Apoplast and Symplast: Transport Continuums
2. Apoplast
3. Symplast
4. Apoplastic route
5. Symplastic route
6. Transmembrane route
7. Short-Distance Transport of Solutes Across Plasma Membranes



1. Short-Distance Transport of Water Across Plasma Membranes
2. Osmosis
3. Water Potential
4. How Solutes and Pressure Affect Water Potential
5. Solute potential
6. Pressure Potential
7. Protoplast
8. Turgor Pressure
9. Water Movement Across Plant Cell Membranes
10. Flaccid
11. Plasmolysis
12. Turgid
13. Wilting
14. Aquaporins: Facilitating Diffusion of water
15. Long-Distance Transport: The Role of Bulk Flow
16. Bulk Flow
17. Where it occurs

PLANT ROOTS ABSORB ESSENTIAL ELEMENTS FROM THE SOIL

1. Macronutrients and Micronutrients



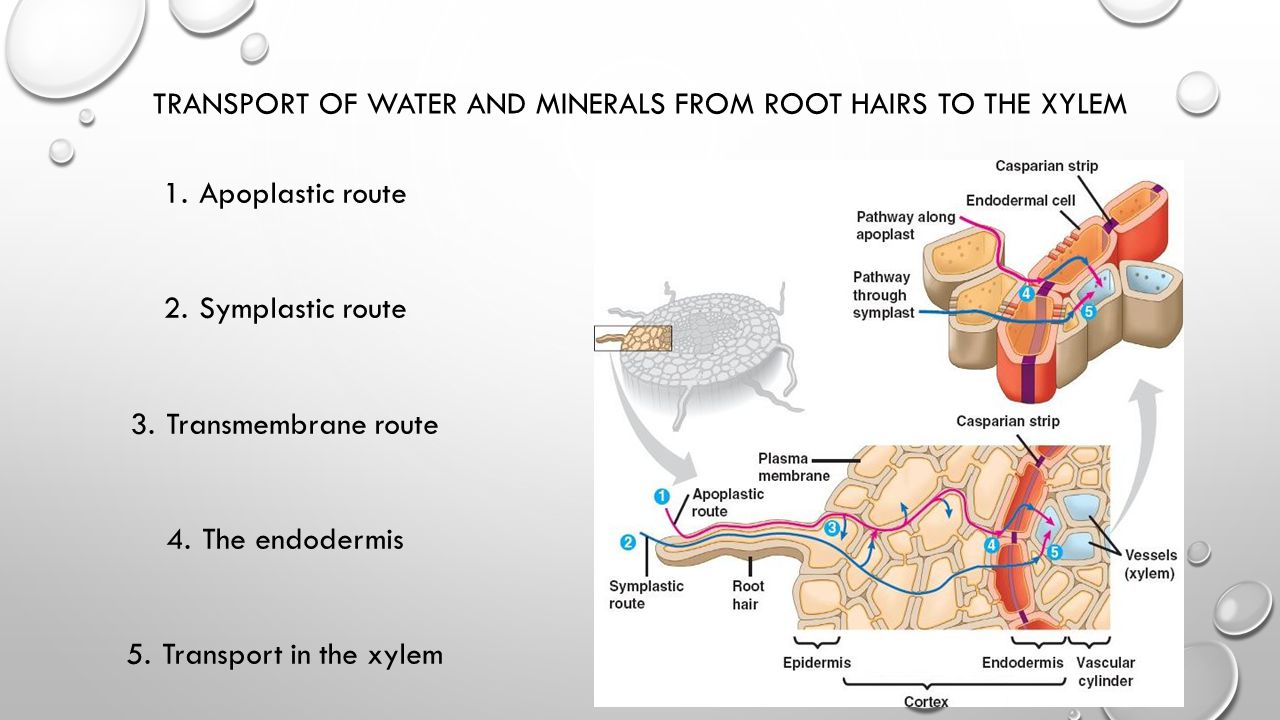
1. Symptoms of Mineral Deficiency
2. Soil Management
3. Fertilization
4. Adjusting soil pH
5. The Living, Complex Ecosystem of Soil
6. Soil Texture
7. Topsoil Composition
8. Inorganic Components
9. Organic Components
10. Living Components

PLANT NUTRITION OFTEN INVOLVES RELATIONSHIPS WITH OTHER ORGANISMS

1. Soil Bacteria and Plant Nutrition
2. Rhizobacteria
3. Bacteria in the Nitrogen Cycle
4. Ammonifying bacteria
5. Nitrogen fixing bacteria
6. Nitrification
7. Nitrifying bacteria
8. Nitrogen-Fixing Bacteria: A Closer Look
9. Nitrogen fixation
10. Nodules
11. Bacteroids
12. Fungi and Plant Nutrition
13. The Two Main Types of Mycorrhizae
14. Ectomycorrhizae
15. Arbuscular mycorrhizae
16. Agricultural and Ecological Importance of Mycorrhizae
17. Epiphytes, Parisitic Plants, and Carnivorous Plants

TRANSPIRATION DRIVES THE TRANSPORT OF WATER AND MINERALS FROM ROOTS TO SHOOTS VIA XYLEM

1. Absorption of Water and Minerals by Root Cells
2. Transport of Water and Minerals into the Xylem

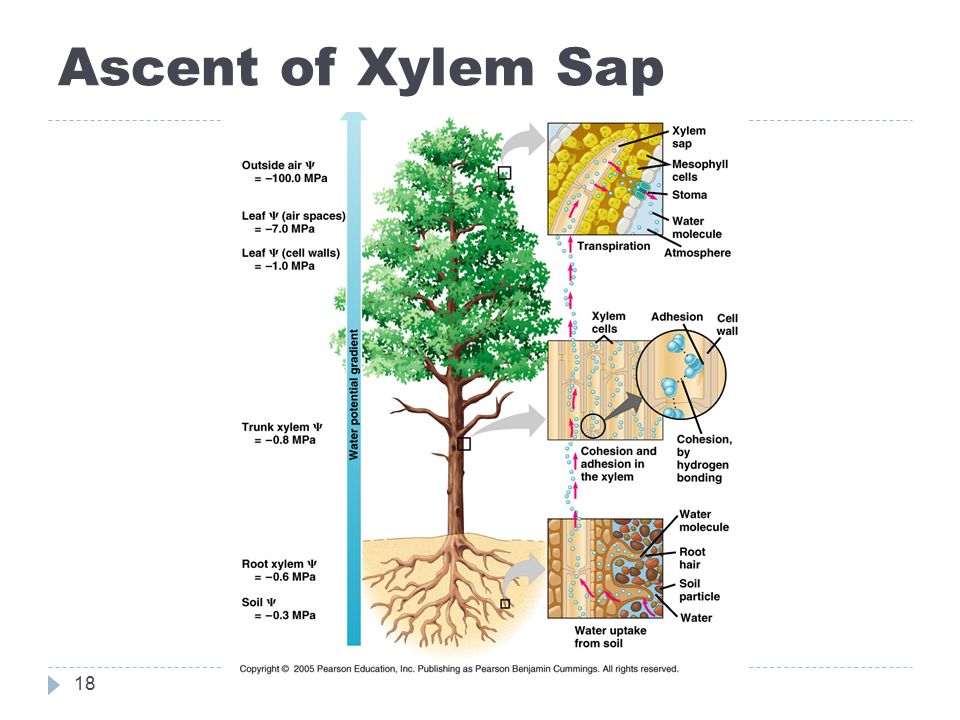


1. Bulk Flow Transport via the Xylem

Xylem Sap

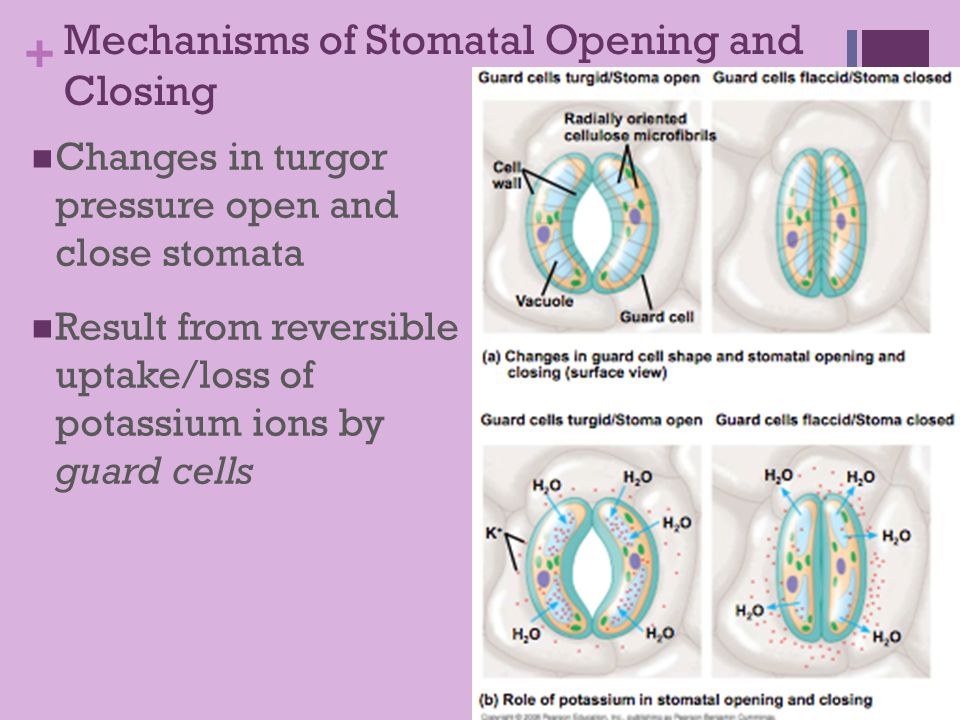
Transpiration

1. Pulling Xylem Sap: The Cohesion-Tension Hypothesis
2. Transpirational Pull
3. Cohesion and Adhesion in the Ascent of Xylem



THE RATE OF TRANSPIRATION IS REGULATED BY STOMATA

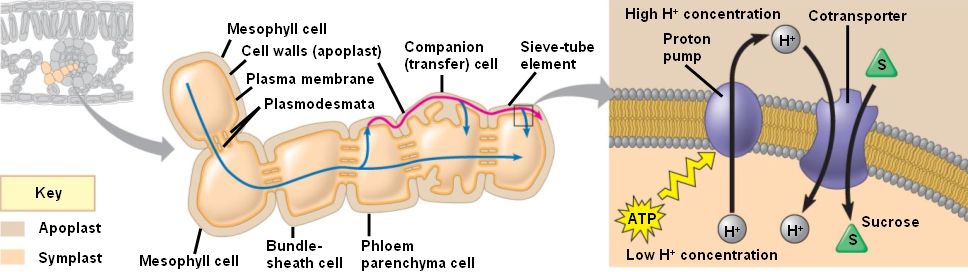
1. Stomata: Major Pathways for Water Loss
2. Mechanisms or Stomatal Opening and Closing



1. Stimuli for Stomatal Opening and Closing
2. Cue 1
3. Cue 2
4. Cue 3
5. Effects of Transpiration on Wilting and Leaf Temperature
6. Adaptations That Reduce Evaporative Water Loss

SUGARS ARE TRANSPORTED FROM SOURCES TO SINKS VIA THE PHLOEM

1. Movement from Sugar Sources to Sugar Sinks



1. Phloem Sap
2. Sugar Source
3. Sugar Sink
4. Bulk Flow by Positive Pressure: The Mechanism of Translocation in Angiosperms

