

### **Exam 2 Study Guide (Lecture Outlines)**

This is only to be used as a guide to my lecture content, and not as a substitute for study of original notes and assigned readings.

## **Topic 07 Water in Plants**

### **I. Osmosis**

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**Terms:** aquaporins, semi-permeable or selectively permeable membranes, hypotonic, hypertonic, isotonic.

- A. Movement into roots.**
- B. Cell to cell movement.**
- C. Apoplastic vs. symplastic movement**

### **II. Cohesion-Tension Theory for Bulk Transport of Water**

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#### **A. Water potential**

#### **B. Transpiration**

**Role of –**

1. Water potential gradient
2. Tension
3. Cohesion
4. Adhesion
5. Stomata

### **III. Role of water in plant growth in development**

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- A. In photosynthesis**
- B. In growth (particularly cell expansion).**
- C. The need for transpiration**

## **Topic 08 Tropisms and Hormones**

### **I. Tropisms**

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#### **A. Gravitropism**

Hormonal basis  
Ecological role

#### **B. Phototropism**

Hormonal basis  
Ecological role

#### **C. Thigmotropism**

Hormonal basis  
Ecological role

## **II. Turgor Movements**

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- A. Venus flytrap (*Dionea*) and sundews (*Drosera*)**
- B. Sensitive plant (*Mimosa pudica*)**
- C. Grass leaves and bulliform cells**
- D. Sunflowers and “heliotropism” of “solar tracking”**

## **III. Hormones**

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### **A. Auxins**

- 1. Structure
- 2. Natural Function
- 3. Human applications

### **B. Cytokinins**

- 1. Structure
- 2. Natural Function
- 3. Human applications

### **C. Gibberrellins**

- 1. Structure
- 2. Natural Function
- 3. Human applications

### **D. Ethylene**

- 1. Structure
- 2. Natural Function
- 3. Human applications

## **Topic 09 Photosynthesis**

### **I. Introduction**

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- A. Photosynthesis and respiration**
- B. Leaf anatomy and its function in photosynthesis**

### **II. Light and Pigments**

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- A. The electromagnetic spectrum**
- B. Action spectrum for photosynthesis (and the general concept of)**
- C. Absorption spectrum for a pigment**

### **III. Details of photosynthetic reactions**

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- A. Light-dependent reactions**
- B. Light-independent reactions**

### **IV. Further Practical Considerations and the Future of Photosynthesis and People**

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**Topic 10**  
**Secondary Metabolites: The Caffeine Example**

**I. Introduction to Plant Secondary Compounds**

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- A. Three major classes of secondary metabolites and examples (Table 10.3)**
- B. Cellular compartmentalization of secondary metabolites.**

**II. Caffeine**

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- A. Plant sources and synonyms of caffeine**
- B. Structure of and Affects of Caffeine on Animals**
- C. Alkaloids in general**
  - Chemical composition and structures
  - Ecological & Biological roles
- D. Caffeine content in various stimulating plants and beverages**

**III. The genus *Coffea* and Coffee**

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- A. Structure and morphology of coffee plants, flowers, and fruits.**
- B. Native origin of *Coffea arabica*.**
- C. History of *Coffea arabica* cultivation and coffee production.**
- D. Other species used for coffee**
- E. World centers of coffee production and amount.**

**Topic 11**  
**Origin of the Chloroplast**

**I. Endosymbiont Theory**

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- A. Lynn Margulis**
  - 1. 1981 “Symbiosis in Cell Evolution”.
  - 2. Terms: Endocytosis, Phagocytosis, aerobic vs. anaerobic bacterium, cyanobacterium
- B. Evidence (focus here on Chloroplast and photosynthesis)**
  - 1. Timing of appearance in the fossil record
    - a. Anaerobic bacteria
    - b. Photosynthetic bacteria
    - c. Aerobic bacteria
    - d. Eukaryotic cells
    - e. Mitochondria and Chloroplasts
  - 2. Cell and Organellar Sizes
  - 3. Replication Mode
  - 4. Ultrastructure
    - a. Chloroplast envelope composition
    - b. Thylakoids
  - 5. Biochemistry
    - a. Photosystems
    - b. Pigments

- c. Ribosomes
- d. ATP synthase
- e. DNA and Genetic Code

**II. Some Intimate Symbiosis between photosymbionts and host cells**

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A. Lichens

B. *Vorticella* & *Chlorella*