

# *CHEMICAL COORDINATION IN PLANTS*



# CHEMICAL COORDINATION IN PLANTS

- Like humans, plants respond to a stimulus
- Their movements are slower



# TYPES OF RESPONSES

- Tropisms
- Day length
- Temperature



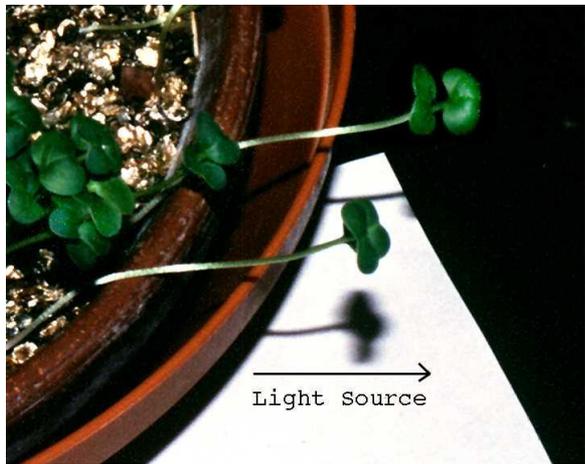
# TROPISMS

- Plants respond involves changing rate of growth
- Two stimuli act on the plant
  - Direction of light
  - gravity

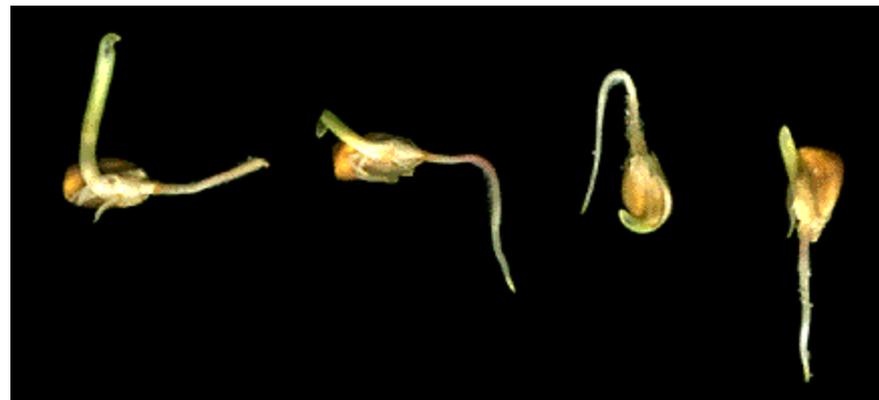


# TROPISM

- Light (phototropism) and gravity (geotropism) are directional stimuli. They act in a particular direction
- The growth response of a plant to a directional stimulus is tropisms



Phototropism



Geotropism



# TROPISM

- Growth can be positive – toward the stimulus
- or negative – away from the stimulus



# TROPISM

- Plant growth
  - Stems exhibit positive phototropism while most roots exhibit negative phototropism.
  - Roots exhibit positive geotropism while stems and leaves exhibit negative geotropism



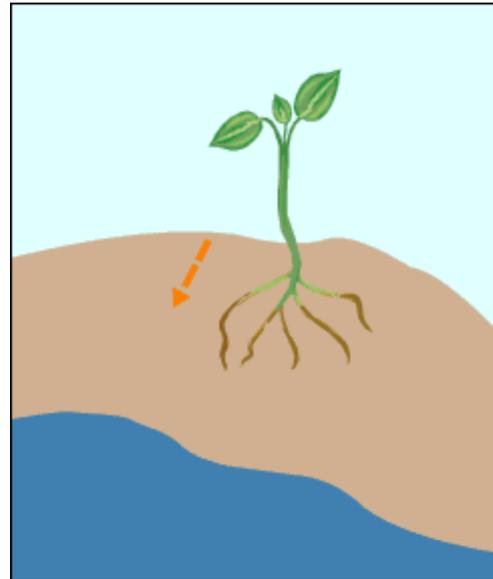
# TROPISM

- Why do aerial part of the plant respond in a positive phototropism?
- Why do roots of a plant respond in a positive geotropism?

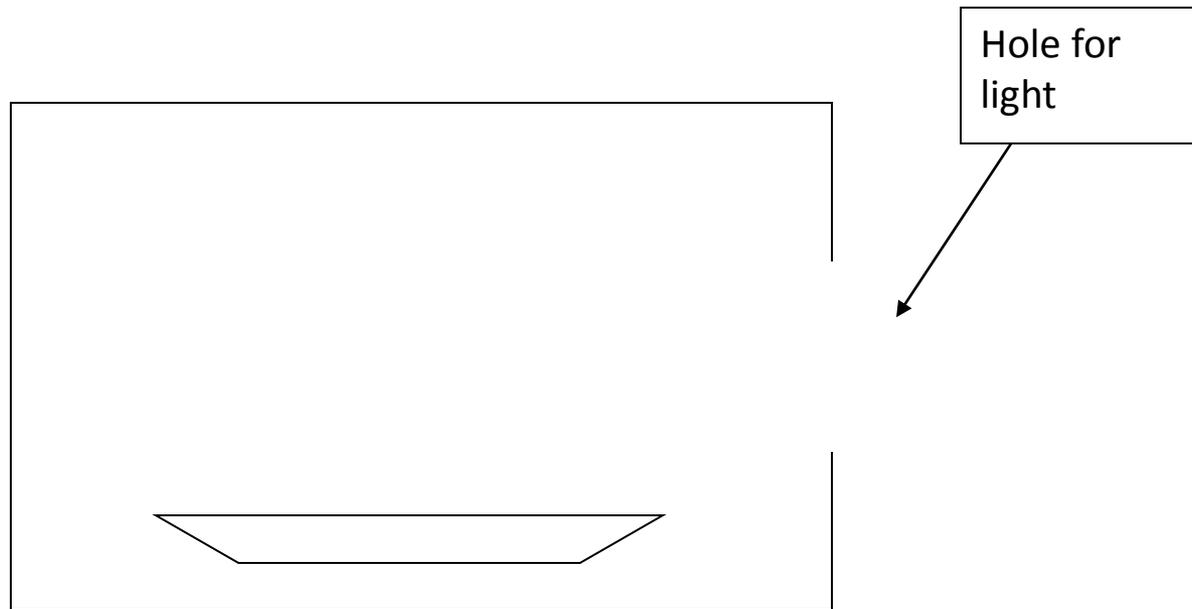


# TROPISM

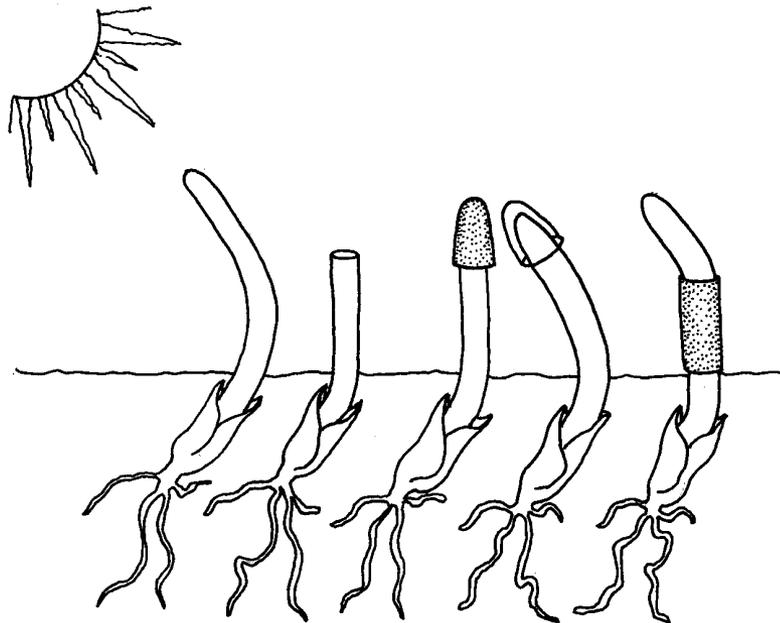
- Some plant roots show a positive hydrotropism



# WHAT WILL HAPPEN

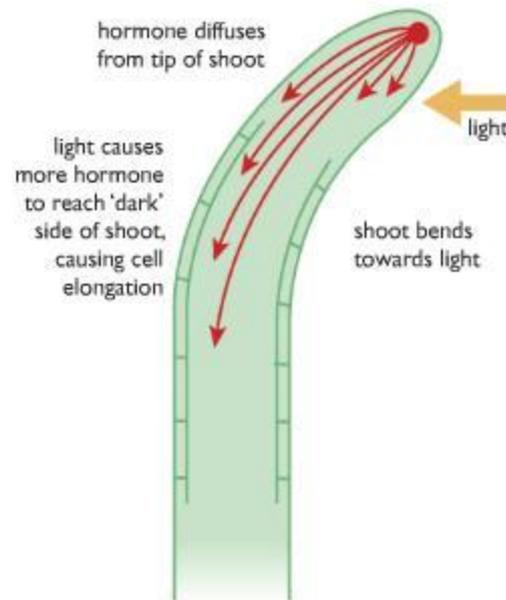


- Complete questions 9 & 10



# DETECTING THE STIMULUS

- Since plants do not have a nervous system, hormones are used to detect the stimulus



# PLANT HORMONES (PLANT GROWTH SUBSTANCES)

- Auxin
- Cytokinin
- Gibberillin
- Abscisic acid
- Ethylene



# AUXIN – PLANT GROWTH REGULATORS

- Location: seed embryo; buds and young leaves
- Function: stem elongation; root growth, differentiation, branching; fruit development; apical dominance; tropisms



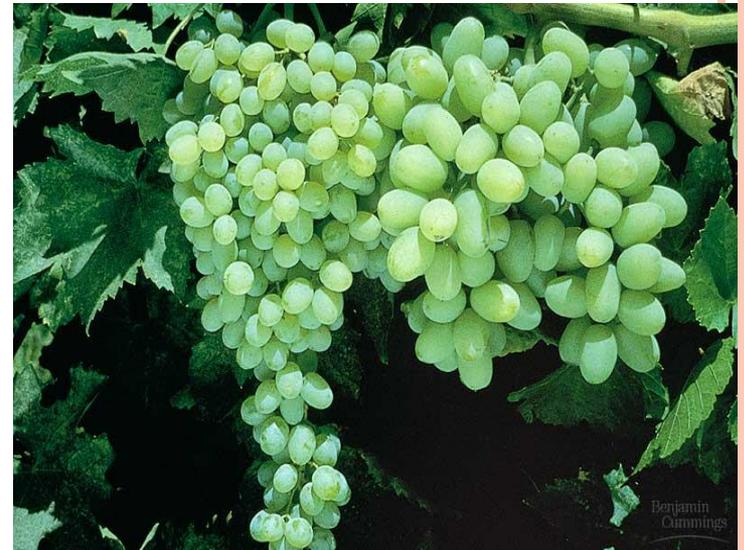
# CYTOKININS

- Location: roots (and actively growing tissues)
- Function: root growth and differentiation; cell division and growth; germination; delay senescence (aging)



# GIBBERELLINS

- Location: meristems of apical buds and roots, young leaves, embryo
- Function: germination of seed and bud; stem elongation; leaf growth; flowering; fruit development; root growth and differentiation



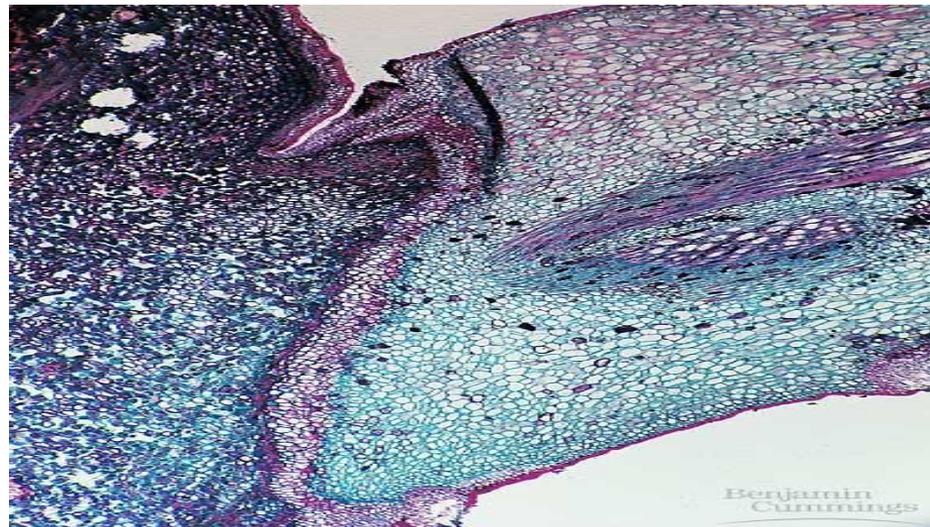
# ABSCISIC ACID

- Location: leaves, stems, roots, green fruit
- Function: inhibits growth; closes stomata during stress

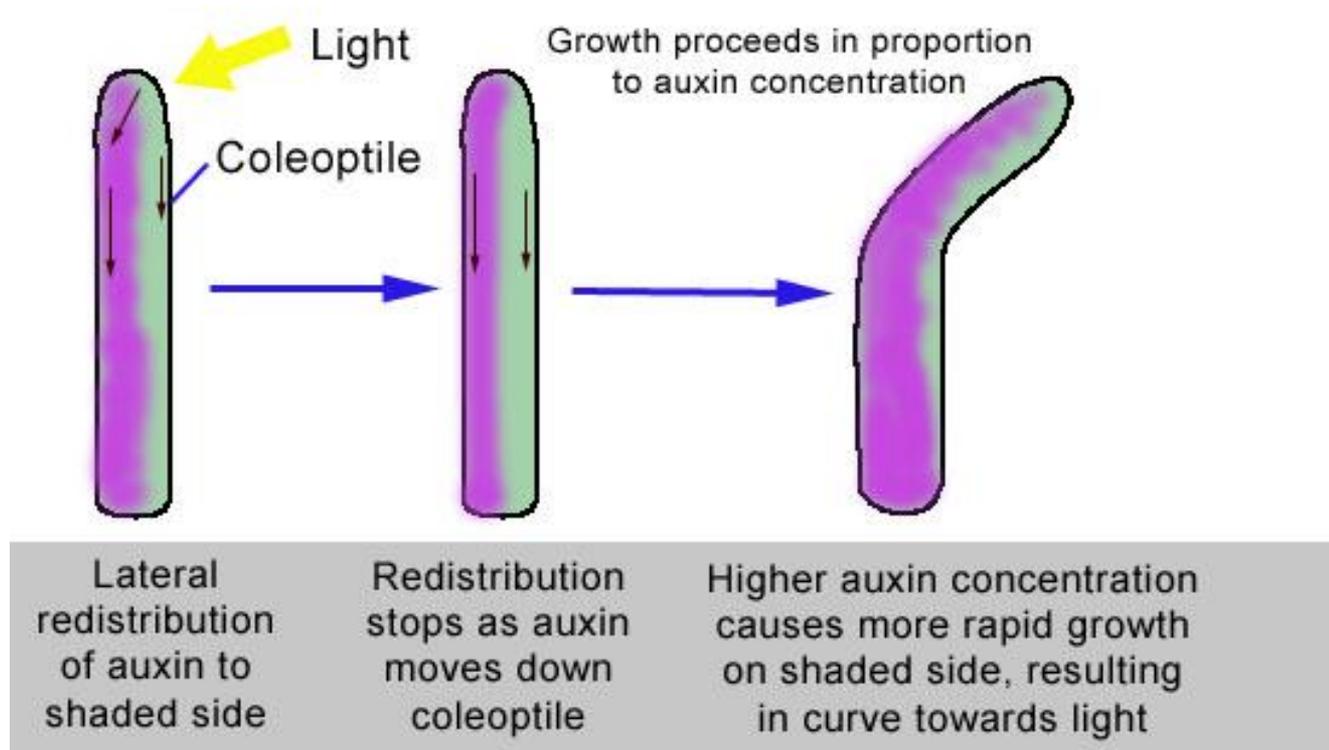


# ETHYLENE

- Location: ripening fruit tissue; stem nodes; aging leaves and flowers
- Function: fruit ripening; promotes/inhibits: growth/development of roots, leaves, and flowers

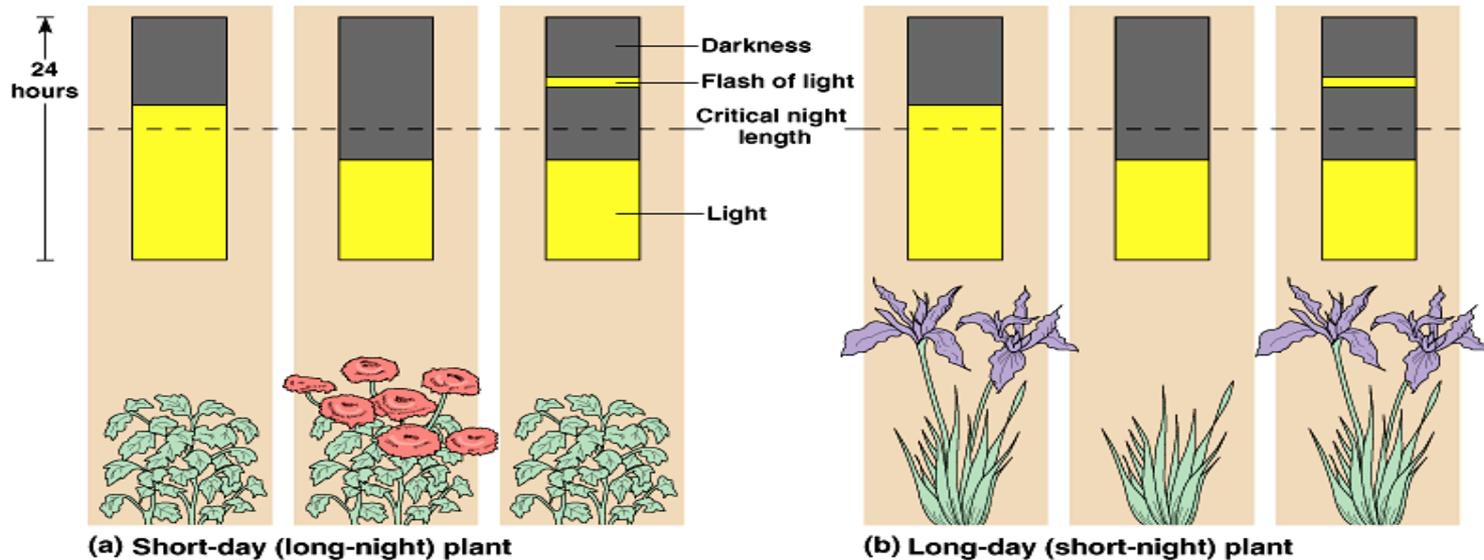


# DETECTING THE STIMULUS



# DAILY AND SEASONAL RESPONSES

- *Photoperiodism - a plants response to light*



# DAILY AND SEASONAL RESPONSES

- Short-day plant: light period shorter than a critical length to flower (flower in late summer, fall, or winter; poinsettias, chrysanthemums)



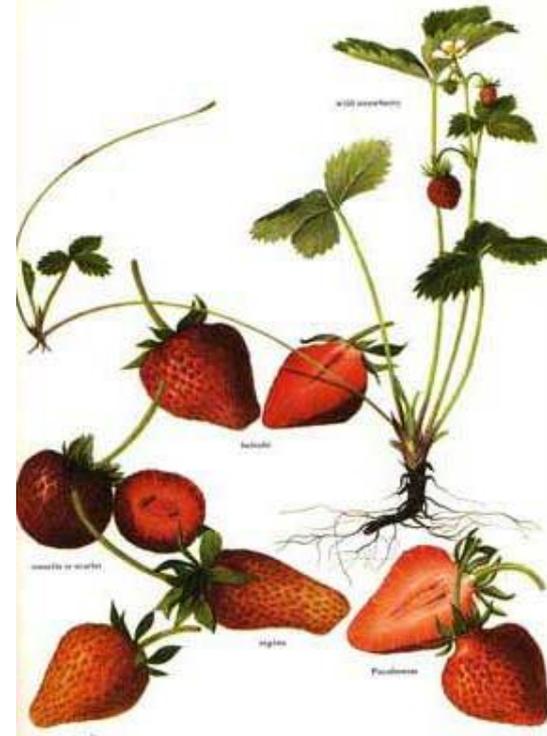
# DAILY AND SEASONAL RESPONSES

- Long-day plant: light period longer than a critical length to flower (flower in late spring or early summer; spinach, radish, lettuce, iris)



# DAILY AND SEASONAL RESPONSES

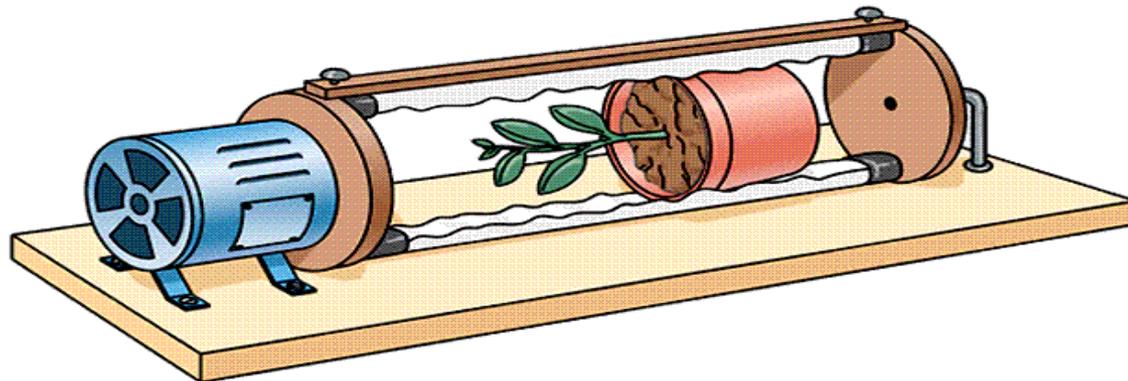
- Day-neutral plant: unaffected by photoperiod (tomatoes, rice, dandelions)
- *Critical night length* controls flowering



# CLINOSTATS

- Used to eliminate any directional stimulus that may act on the seed
- A clinostat only produces the effect of weightlessness along its axis of rotation
- Explain what will happen to the roots

**A Clinostat**



# EXPERIMENTS

- Read Experiment 14 on page 140 and complete questions on your sheet

