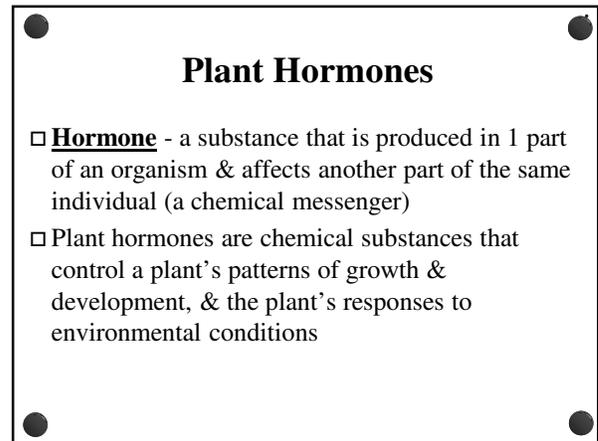
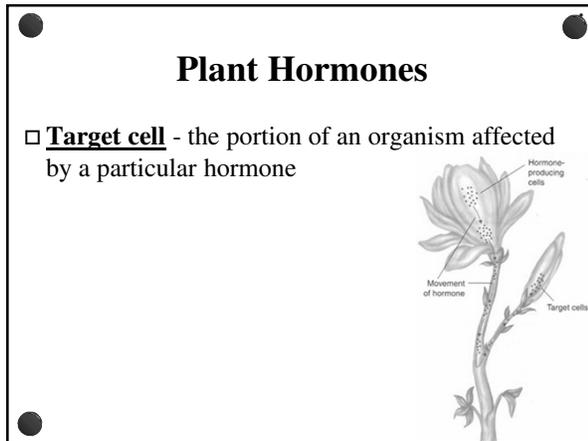


## Plant Responses and Adaptations



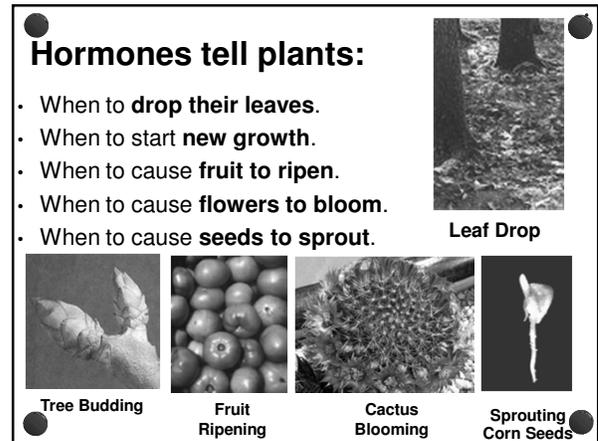
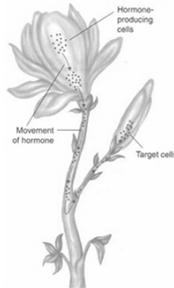
## Plant Hormones

- **Hormone** - a substance that is produced in 1 part of an organism & affects another part of the same individual (a chemical messenger)
- Plant hormones are chemical substances that control a plant's patterns of growth & development, & the plant's responses to environmental conditions



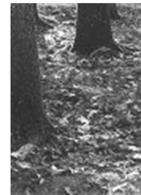
## Plant Hormones

- **Target cell** - the portion of an organism affected by a particular hormone



## Hormones tell plants:

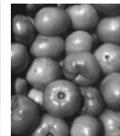
- When to **drop their leaves**.
- When to start **new growth**.
- When to cause **fruit to ripen**.
- When to cause **flowers to bloom**.
- When to cause **seeds to sprout**.



Leaf Drop



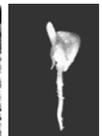
Tree Budding



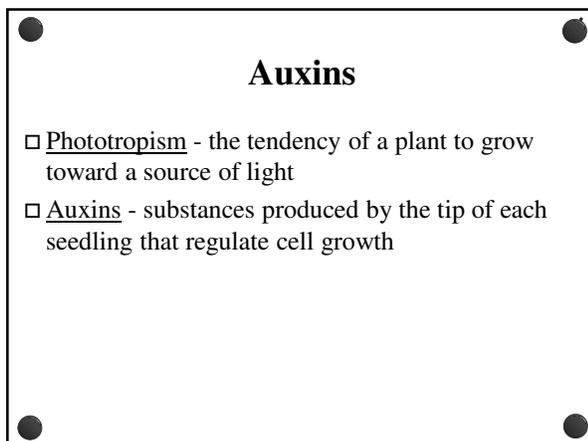
Fruit Ripening



Cactus Blooming

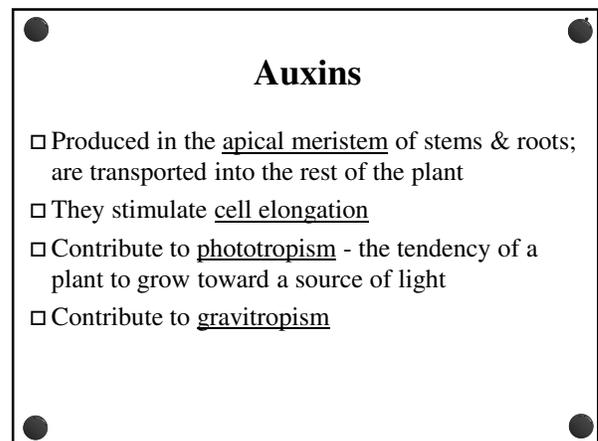


Sprouting Corn Seeds



## Auxins

- **Phototropism** - the tendency of a plant to grow toward a source of light
- **Auxins** - substances produced by the tip of each seedling that regulate cell growth

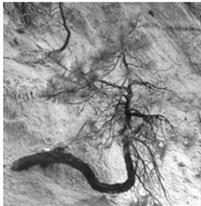


## Auxins

- Produced in the **apical meristem** of stems & roots; are transported into the rest of the plant
- They stimulate **cell elongation**
- Contribute to **phototropism** - the tendency of a plant to grow toward a source of light
- Contribute to **gravitropism**

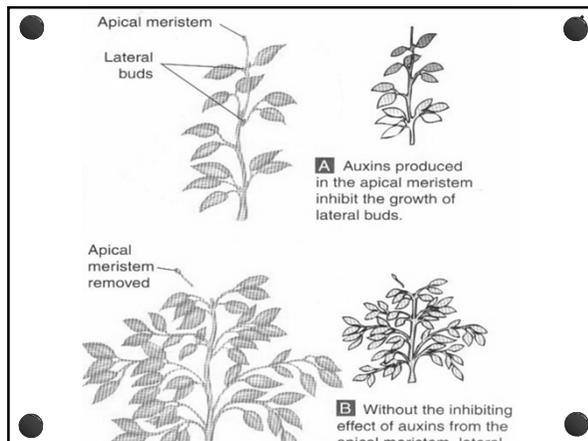
## Auxins & Gravitropism

- Gravitropism - the response of a plant to the force of gravity, caused by auxins
- In stems, auxins stimulate cell elongation, helping turn the trunk upright
- In roots, auxins inhibit cell growth & elongation, causing the roots to grow downward



## Auxins & Branching

- Inhibit lateral growth which causes apical dominance.
- Apical dominance - the closer a bud is to the stem's tip, the more it is inhibited, because auxins move out from the apical meristem
- Lateral bud - a meristematic area on the side of a stem that gives rise to side branches



## Auxinlike Weed Killers

- Herbicides - compounds that are toxic to plants, many contain high concentrations of auxins since auxins inhibit growth

## Cytokinins

- Cytokinins - plant hormones that are produced in growing roots & in developing fruits & seeds
- In plants, cytokinins stimulate growth of lateral buds, & cause dormant seeds to sprout

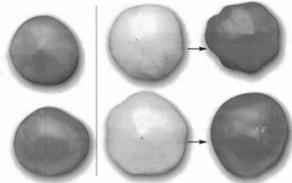
## Gibberellins

- Gibberellin - a growth-promoting substance
- Gibberellins produce dramatic increases in size, particularly in stems & fruit



## Ethylene

- Ethylene - 1 of the minor components of natural gas
- In response to auxins, fruit tissues release small amounts of the hormone ethylene
- Ethylene then stimulates fruits to ripen

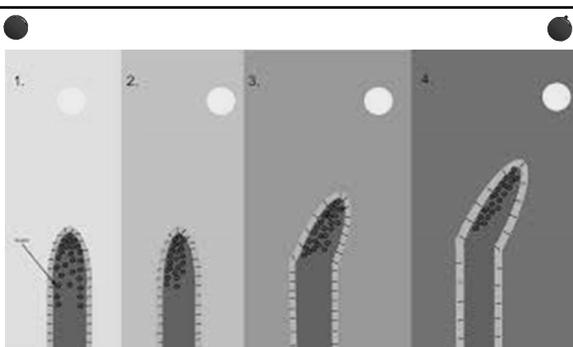
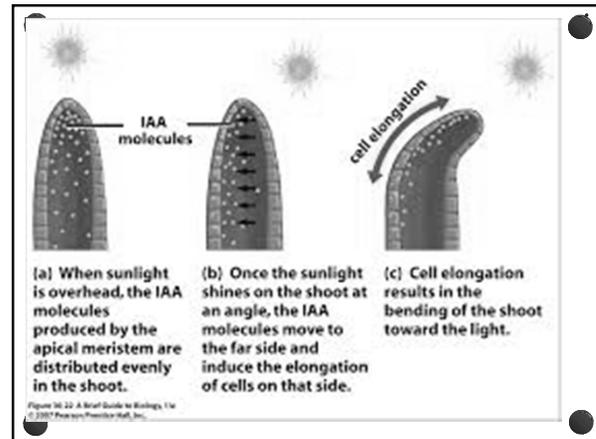


## Tropisms

- Tropisms - the responses of plants to external stimuli
- Plant tropisms include gravitropism, phototropism, & thigmotropism
- Each of these responses demonstrates the ability of plants to respond effectively to external stimuli, such as gravity, light, & touch

## Gravitropism & Phototropism

- Gravitropism - the response of a plant to gravity
- Phototropism - the response of a plant to a light source



## Nastic Movements

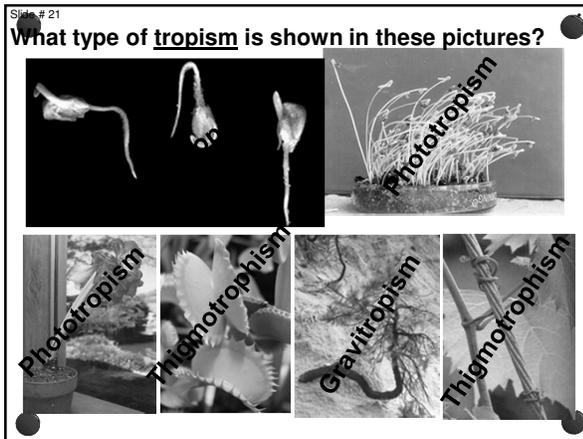
- **Thigmonastic Movements**
  - Usually occur in response to touching a plant
  - Usually rapid
  - Examples: Venus fly trap closing, leaves folding on a plant when touched (Mimosa)
  - Caused by rapid loss of turgor pressure (water pressure) in cells
  - Advantage? Prevents water loss and discourages insect feeding

## Nastic Movements

- Nyctinastic Movements
  - Responses to daily light and dark cycles
  - Caused by a gradual loss in water pressure in cells
  - Not rapid
  - Example: Prayer plant

## Thigmotropism

- Thigmotropism - the response of a plant to touch



## Photoperiodism

- Short-day plants - plants that flower when the days are short
  - Ex.) Poinsettias, & chrysanthemums
- Long-day plants - plants that flower when the days are long
  - Ex.) Spinach, & irises

## Photoperiodism

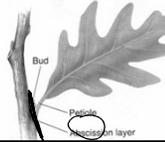
- Photoperiodism - a plant's response to light & dark
- Photoperiodism in plants is responsible for the timing of seasonal activities such as flowering & growth
- Phytochrome - a plant pigment that is responsible for photoperiodism (absorbs red light)
- Vernalization - causing plants to flower by exposing them to cold temperatures

## Winter Dormancy

- Dormancy - the period when an organism's growth & activity decrease or stop
- As cold weather approaches, deciduous plants turn off photosynthetic pathways, transport materials from leaves to roots, & seal leaves off from the rest of the plant

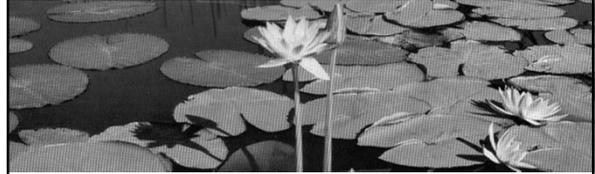
## Leaf Abscission

- Abscission layer - layer of cells at the petiole seals the leaf off from the plant's vascular system
- Before long, the leaf falls to the ground, a sign that the tree is fully prepared for winter



## Aquatic Plants

- To take in sufficient oxygen, many aquatic plants have tissues with large air-filled spaces through which oxygen can diffuse



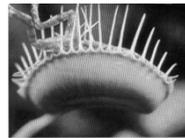
## Desert Plants

- Xerophytes - plants that live in the desert
- Plant adaptations to a desert climate include extensive roots, reduced leaves, & thick stems that can store water



## Nutritional Specialists

- Plants that have specialized features for obtaining nutrients include carnivorous plants (digest insects) & parasites
- Parasites grow into tissues of their host plant & extract water & nutrients, causing harm to host



Carnivorous Plant: Venus' flytrap



Parasite: Mistletoe

## Epiphytes

- Epiphytes - plants that are not rooted in soil, but instead grow directly on the bodies of other plants
- Found mostly in the tropical rain forest

## Chemical Defenses

- Many plants defend themselves against insect attack by manufacturing compounds that have powerful effects on animals



## OVERVIEW

Hormones (know functions):

- Auxin
- Cytokinin
- Gibberellin
- Ethylene

Tropisms

- Phototropism
- Gravitropism
- Thigmotropism