Lab 7 Plant Growth

October 11, 2011

Determinate growth: Determinate growth involves growth that stops at a particular time or when an organism reaches a certain size.

Indeterminate growth: Indeterminate growth is growth that continues throughout an organism’s life span.

Meristematic tissue is made up of undifferentiated cells in plants that divide to grow into other plant tissues.

Three steps are needed for any biological signaling process.

- Reception: Receptors are proteins that undergo small shape changes in response to a stimulus.

- Transduction: Second messengers are small molecules that amplify and transfer the signal from the receptor protein to other proteins that carry out the response.

- Response: There are two types of responses that you should be familiar with.
  - Transcriptional Regulation: make more enzymes or other proteins
  - Post translational modification: modify existing enzymes or other proteins
Hormones: signaling molecules

• Auxin (IAA) indoleacetic acid is important for:
  – stem elongation in low concentration
  – inhibiting growth when in high concentration

• Gibberellins are hormones that are important for:
  – stem elongation
  – fruit growth
  – germination of seeds

• Abscisic Acid (ABA) is a hormone important for:
  – inhibits growth
  – important for dormancy and drought tolerance

Seed Growth Terms

• Dormancy: state when growth stops and metabolism is very slow

• Germination: water is absorbed (imbibition) and Gibberellins are released. Gibberellins promote growth and the production of digestive enzymes

You should be able to identify and describe the following parts of a germinated angiosperm seed.

• endosperm

• seed coat

• embryo
  – cotyledons: "seed leaves" that absorb food from the endosperm and provide stored food for the growing embryo.
  – radicle: embryonic root
  – epicotyl: embryonic stem above cotyledon/cotyledons
  – hypocotyl: embryonic stem between radicle and cotyledons
Responses to Stimuli

- **Phototropism**
  - Phototropism is growth towards or away from light.
  - Auxin produced in the coleoptile tip is important for this type of growth.

- **Gravotropism**
  - Gravotropism is growth in response to gravity.
  - Roots grow in direction of gravitational pull.
  - Stems grow away from gravitational pull.
  - Statoliths are dense starch containing plastids that help plants respond to gravity.

- **Thigmotropism**
  - Thigmotropism is response to touch.
  - Mimosa closing in response to touch is a good example.
  - Closing in mimosa occurs by rapid loss of water and potassium ions from specialized motor cells.

- **Action potentials**
  - Action potentials are electrical transmission of signals.
  - In plants action potentials work similarly to how they work in animal nerve cells, but much slower and use different ions.
  - Chloride and Calcium ions are used in plants, while sodium ions are used in animals.