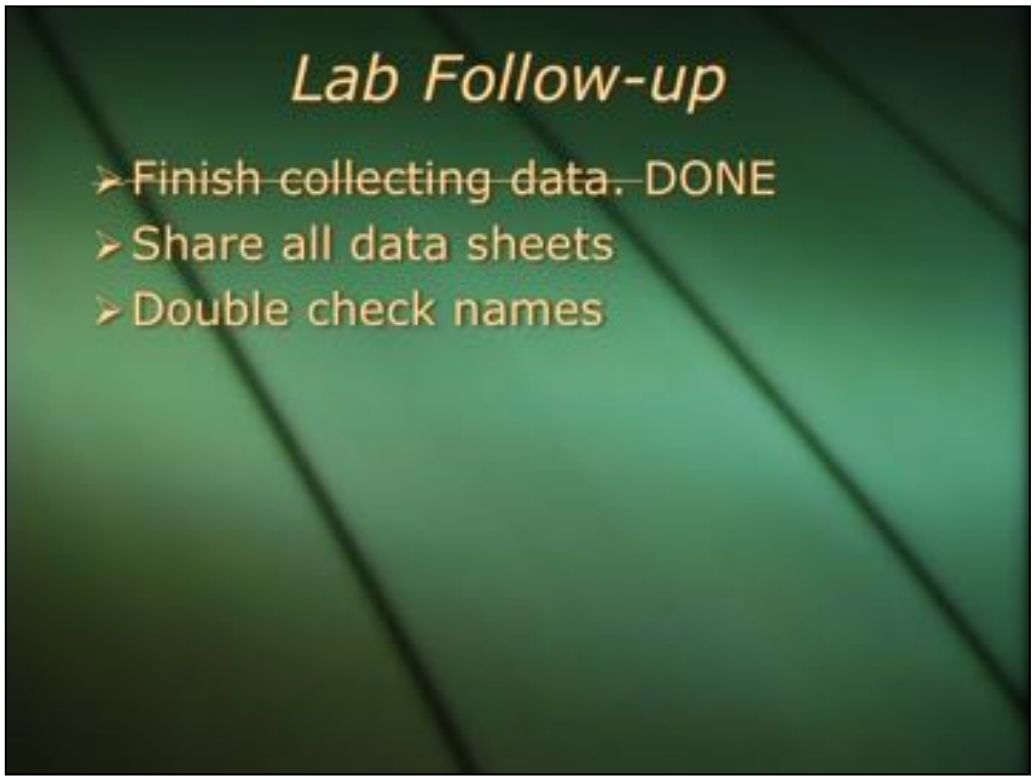
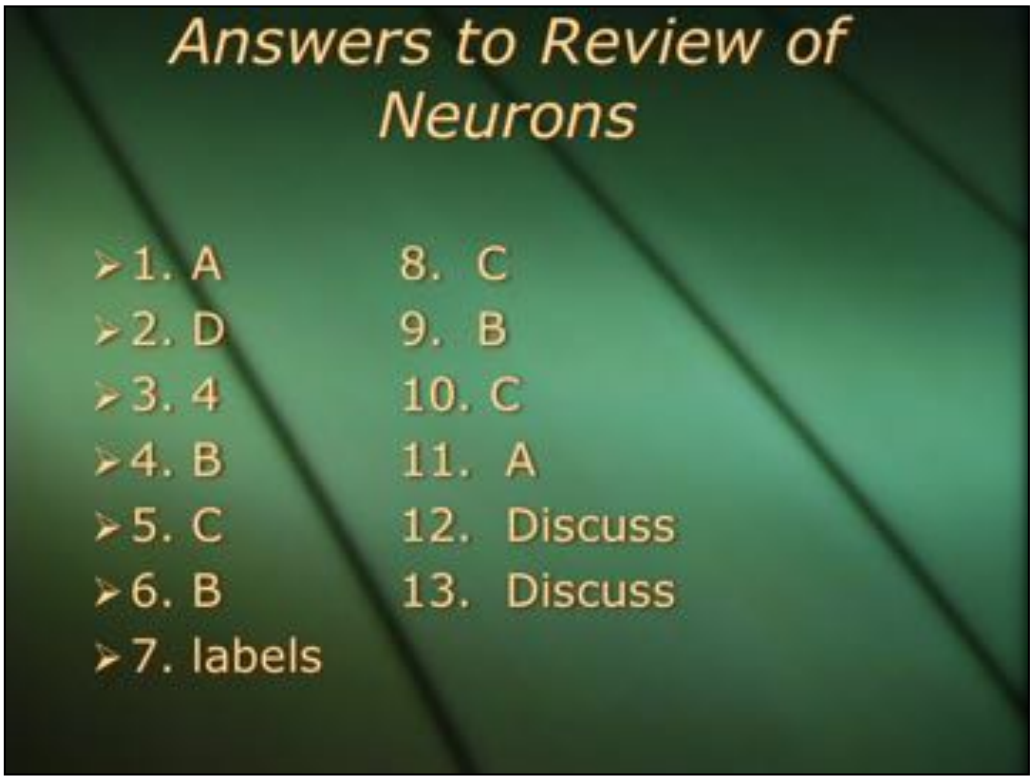
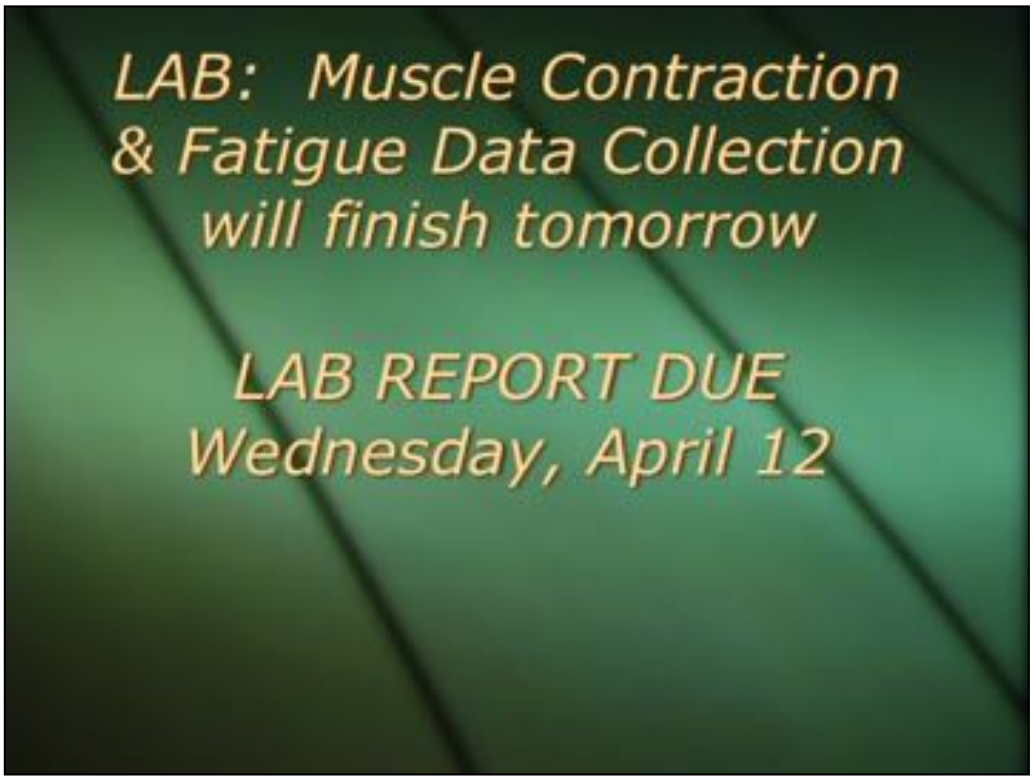
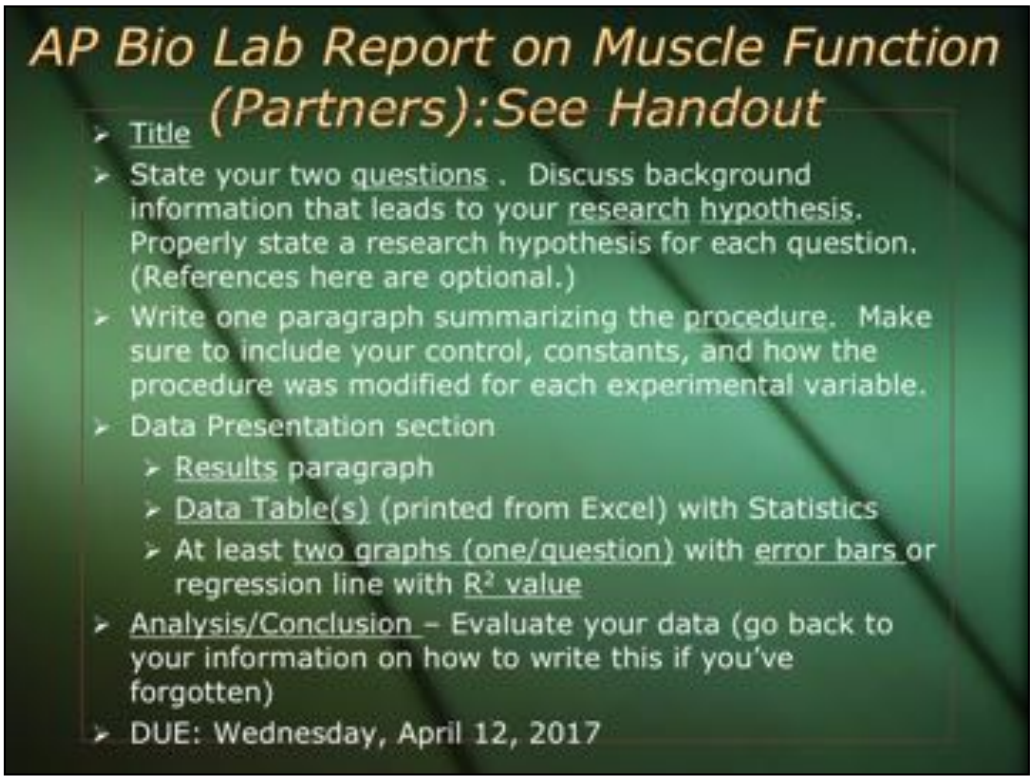

Lab Follow-up
Finish collecting data. DONE
Share all data sheets
Double check names

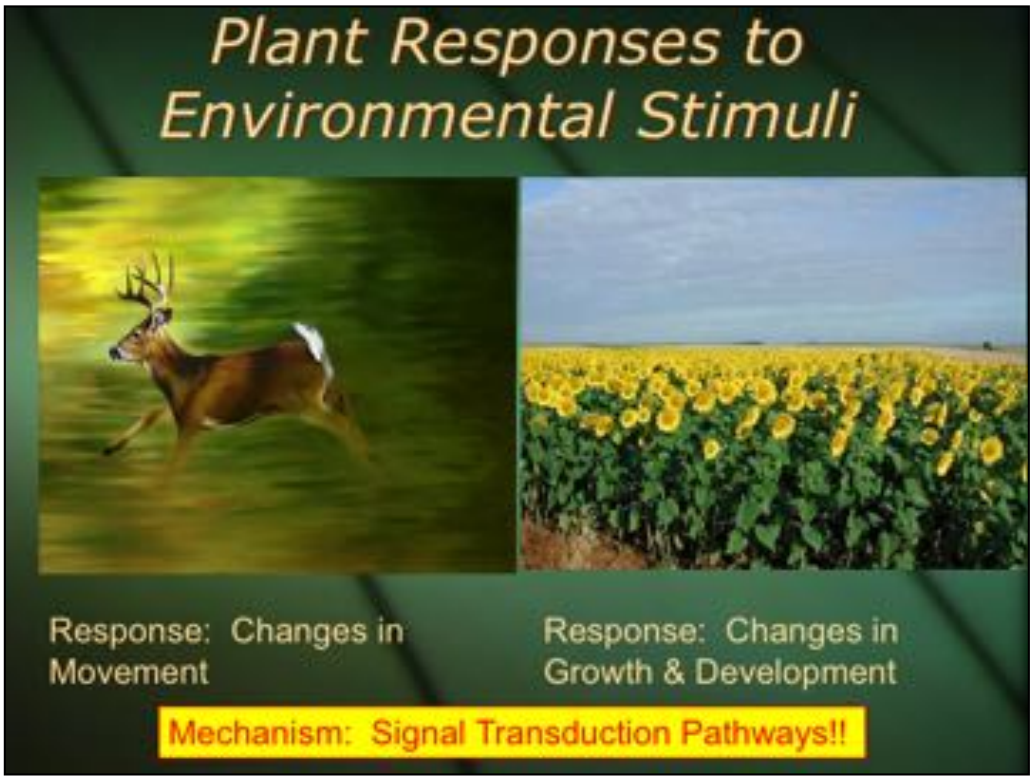

Answers to Review of Neurons
1. A
2. D
3. 4
4. B
5. C
6. B
7. labels
8. C
9. B
10. C
11. A
12. Discuss
13. Discuss


LAB: Muscle Contraction
& Fatigue Data Collection
will finish tomorrow
LAB REPORT DUE
Wednesday, April 12

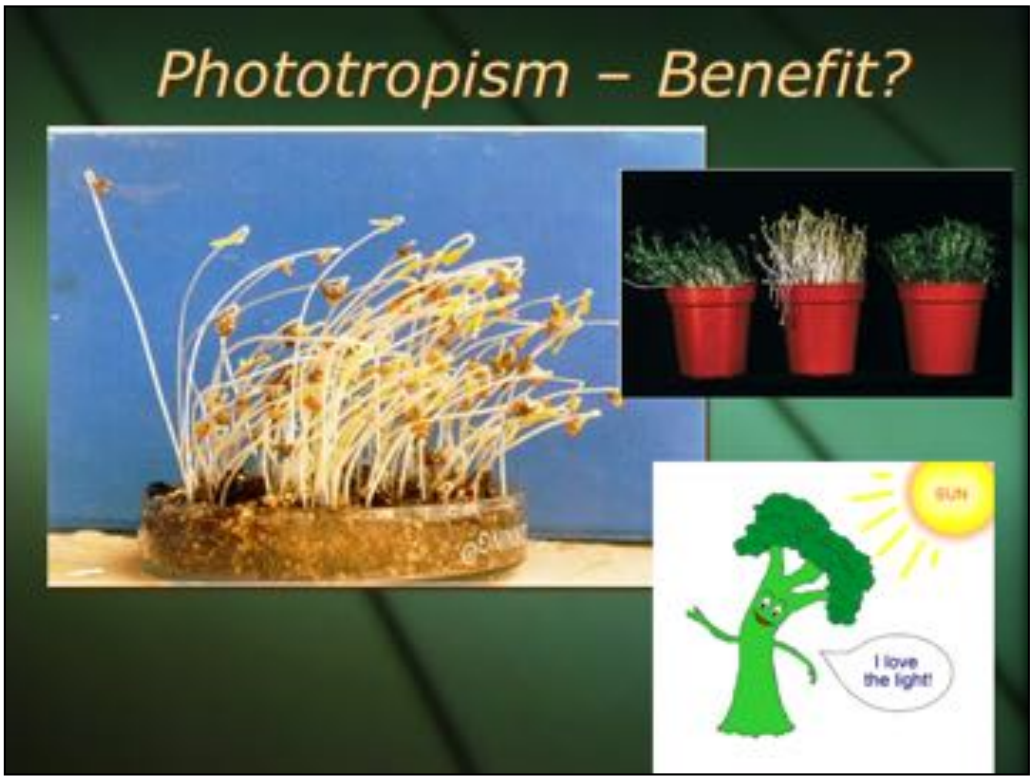

AP Bio Lab Report on Muscle Function (Partners):See Handout
Title
State your two questions . Discuss background information that leads to your research hypothesis. Properly state a research hypothesis for each question. (References here are optional.)
Write one paragraph summarizing the procedure. Make sure to include your control, constants, and how the procedure was modified for each experimental variable.
Data Presentation section
Results paragraph
Data Table(s) (printed from Excel) with Statistics
At least two graphs (one/question) with error bars or regression line with R² value
Analysis/Conclusion – Evaluate your data (go back to your information on how to write this if you've forgotten)
DUE: Wednesday, April 12, 2017

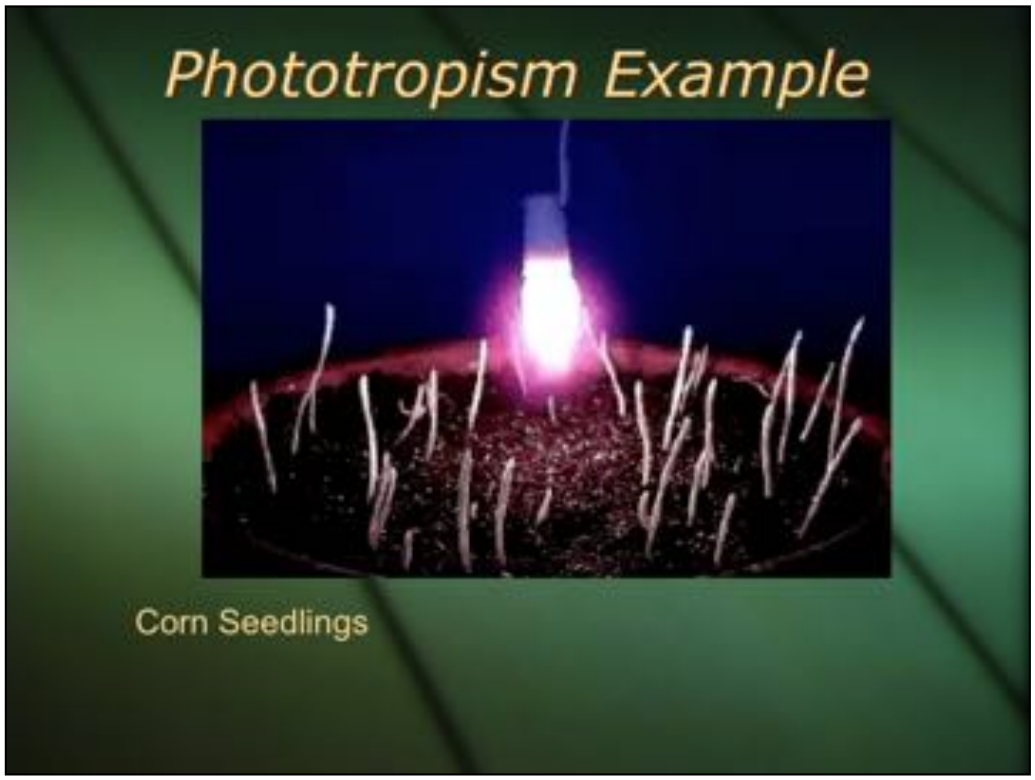

Our Variables
1. Continuous vs Repetitive Grip
2. Sex
3. Dominant v Non-Dominant Hand
4. Hand Size
5. Forearm Size
6. Vision vs Non-Vision
7. Coaching v Non-Coaching
Maximum Force (initially)
Median Force over time
Maximum Force over time
Overall rate of Fatigue (overall Slope)


0
20
40
60
80
10
30
50
70
90
Time (s)

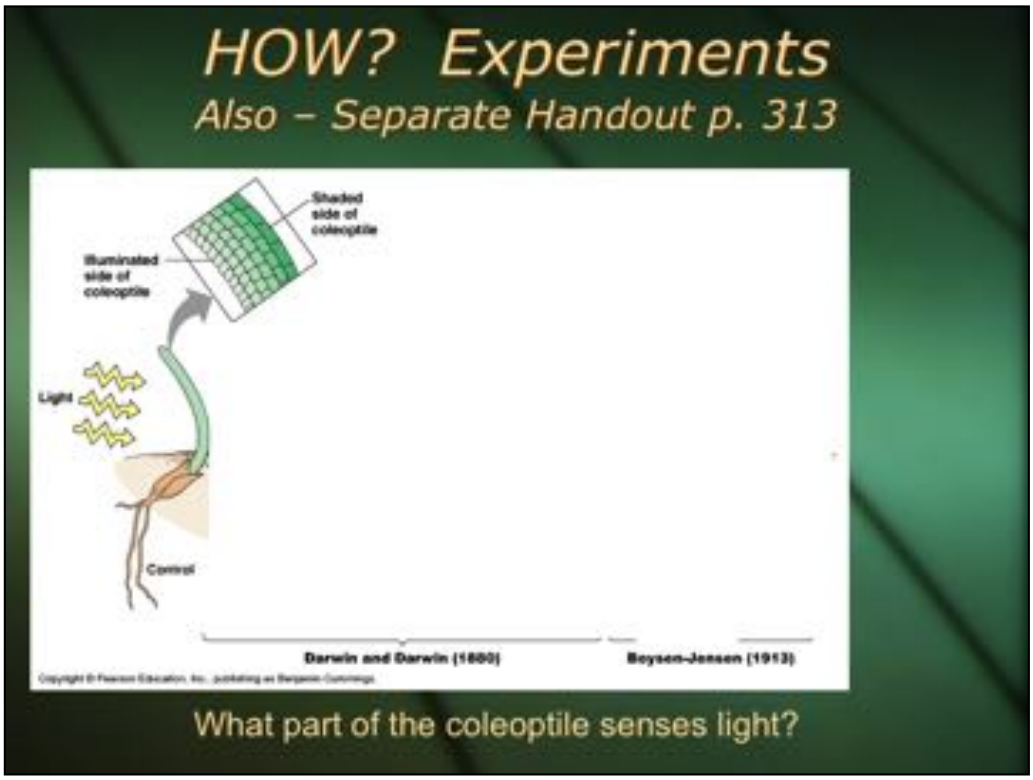

Plant Responses to Environmental Stimuli
Response: Changes in Movement
Response: Changes in Growth & Development
Mechanism: Signal Transduction Pathways!!

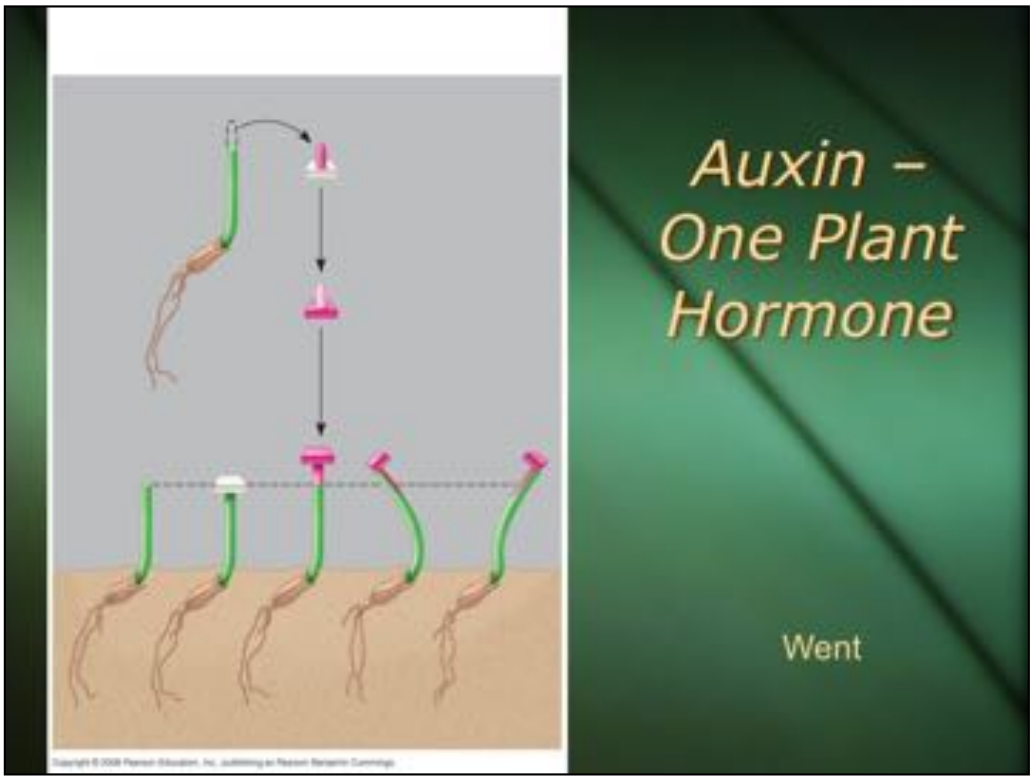

Tropisms - Intro
britannica.com
Growth Movements

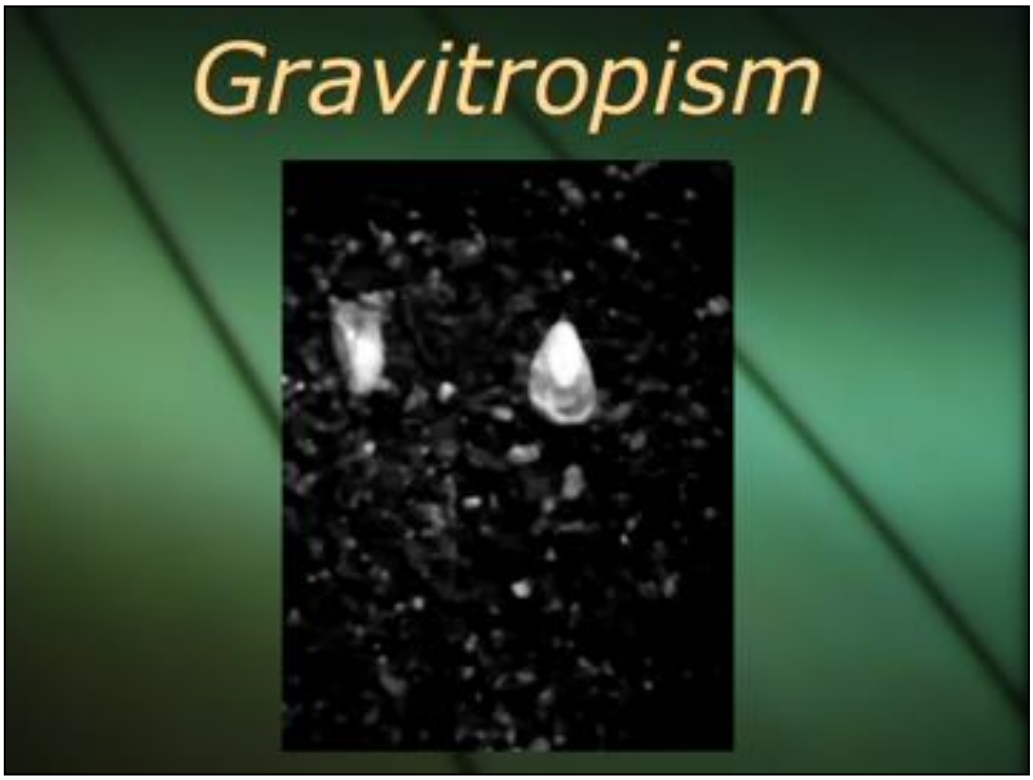

Phototropism – Benefit?
SUN
I love the light!

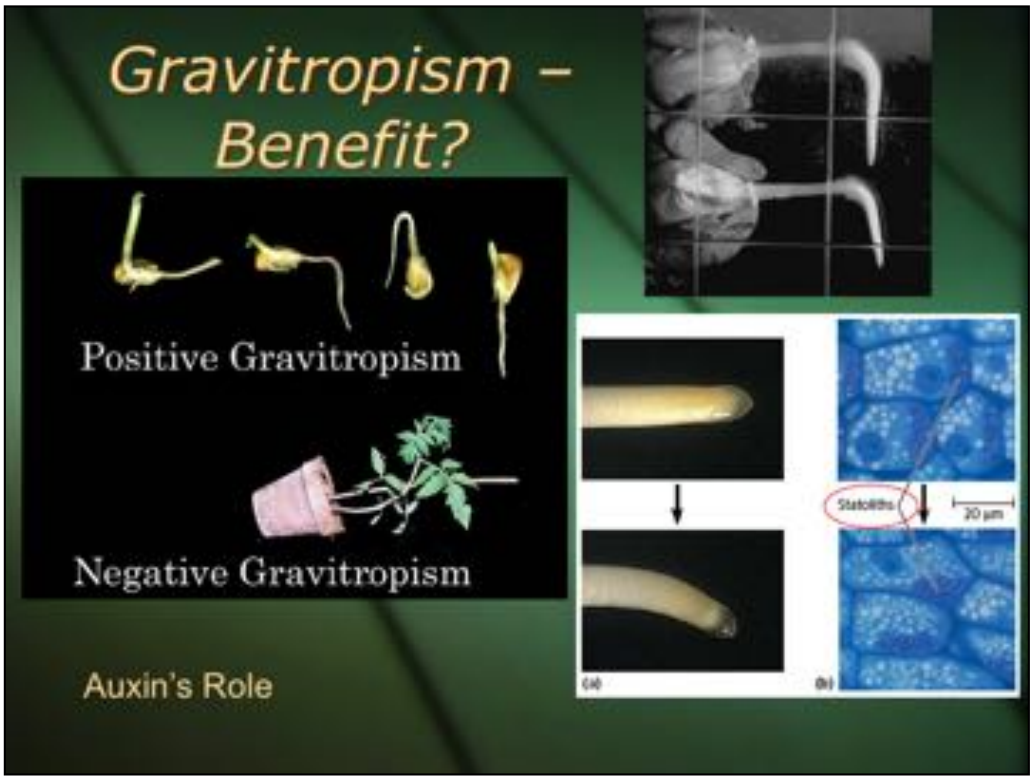


Play Video Segment: Round the Bend (0-4:00 min)


HOW? Experiments
Also – Separate Handout p. 313
Shaded side of coleoptile
Illuminated side of coleoptile
Light
Control
Darwin and Darwin (1880)
Boysen-Jensen (1913)
What part of the coleoptile senses light?


Auxin –
One Plant
Hormone
Went


Gravitropism



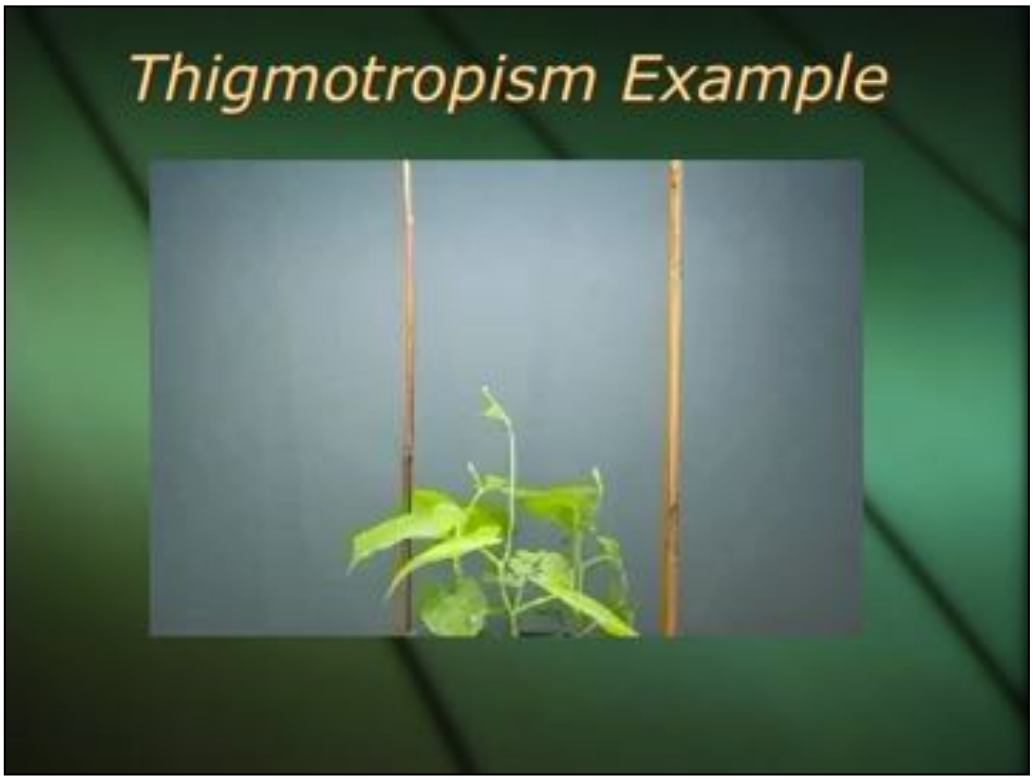
Ausin inhibits elongation in the root –

Hormones can have different effects in different plant tissues

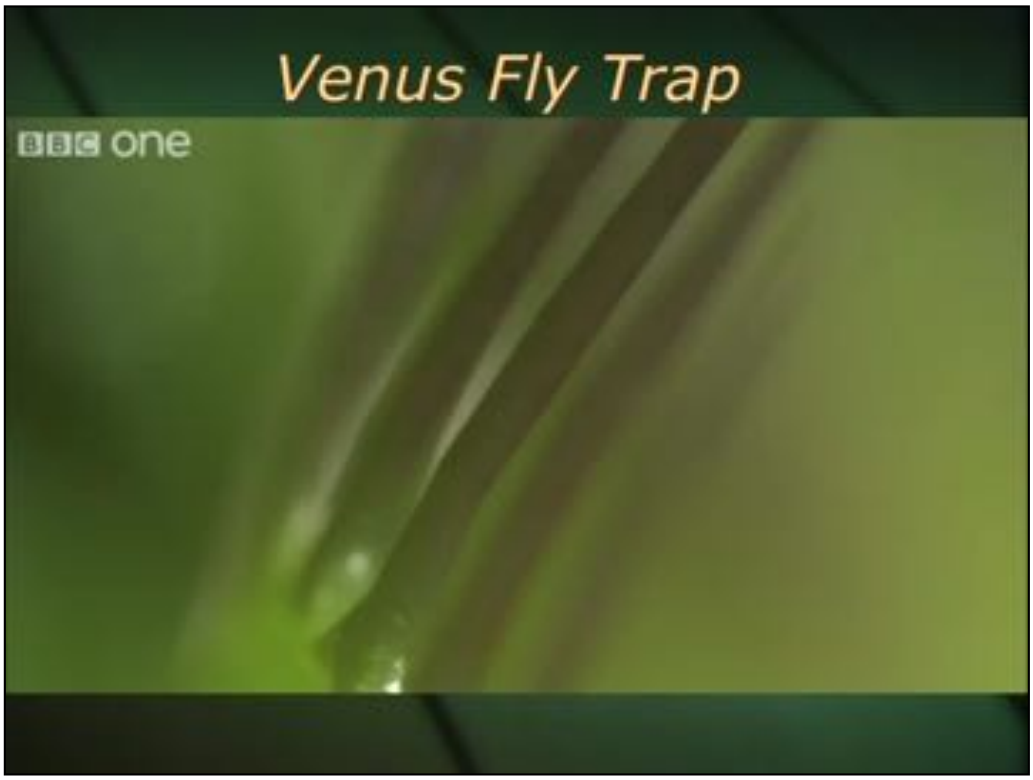
A Statolith is a plastid with starch, heavy, settles, redistributes auxin -→ Redistributes auxin to lower zone of elongation → auxin inhbits elongation in roots

http://www.psb.ugent.be/auxin-projects/286-endocytosis-and-recycling-in-plants


Thigmotropism


Thigmotropism Example


Carnivorous Plants
(More Thigmotropisms)

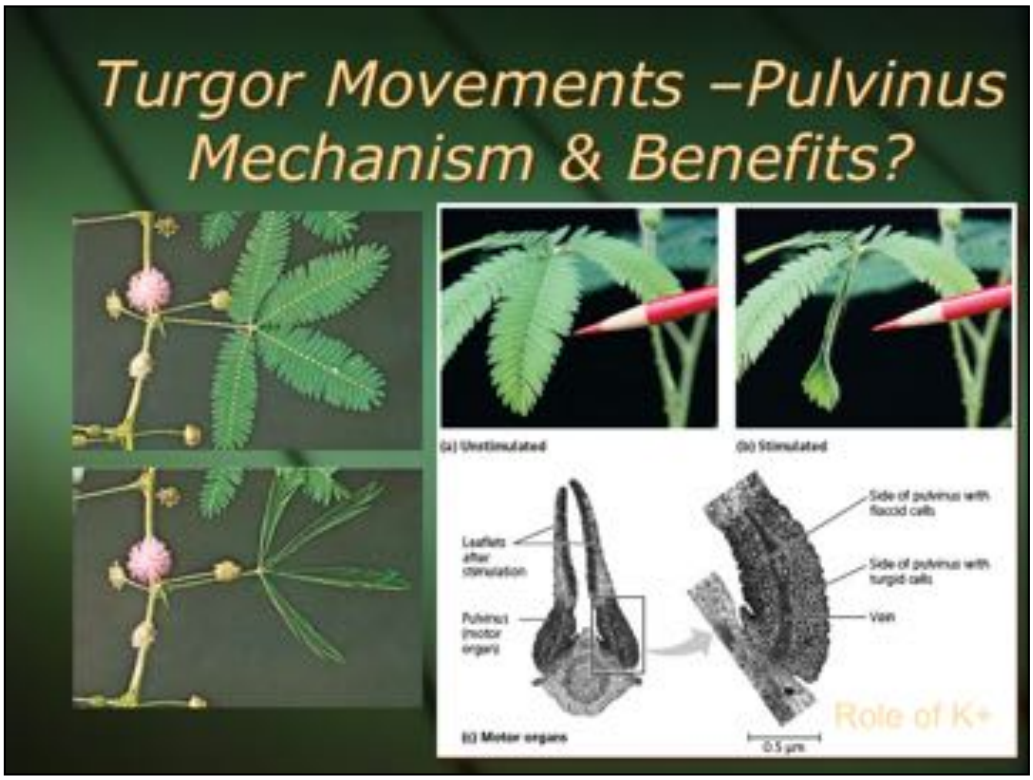

Venus Fly Trap
BBC one


Venus Fly Trap
Mechanism:
Watch Segment from
National Geographic's
"Death Trap"
Start: 8:30 – 13:30

Small prey, mainly consisting of insects, are attracted by the sweet secretions of the peduncular glands. Upon touching these, the prey become entrapped by sticky mucilage which prevents their progress or escape. Eventually, the prey either succumb to death through exhaustion or through asphyxiation as the mucilage envelops them and clogs their spiracles. Death usually occurs within 15 min.[6] The plant meanwhile secretes esterase, peroxidase, phosphatase and protease enzymes.[7] These enzymes both dissolve the insect and free the contained nutrients. The nutrient soup is then absorbed through the leaf surfaces and can then be used to help fuel plant growth.


Sensitive Plant
Tugor Movements


Sensitive Plant Movements



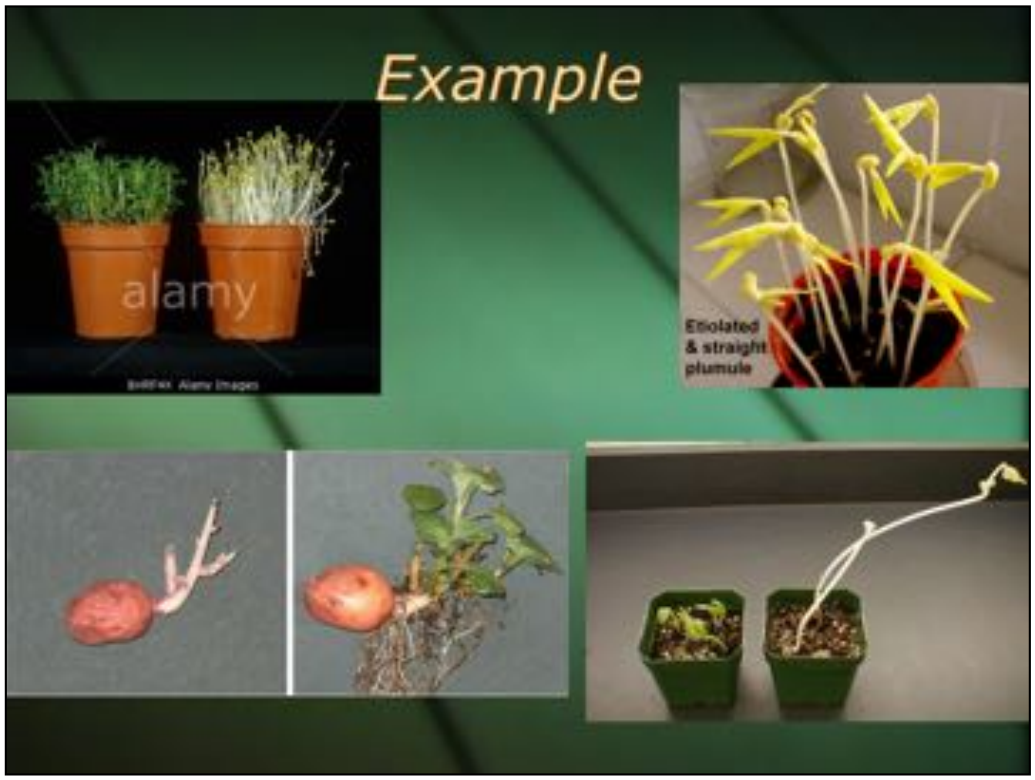
Response travels about 1 cm/sec

Action potentials

Active transport o K+ out of cells – become flaccid, fold inwards.

10 Minutes to restore

The hormones in the plant change so it grows longer before making a leaf node, the pale colour is because it doesn't have any chlorophyll – that's only produced in response to light. If it's grown in complete darkness the plant is depending on the original energy stores in the seed and will die when they are used up. The point is to get the leaves up to the light so they can get some energy through photosynthesis, however it's a payoff as the stems are weak. Hopefully for the plant the leaves will get there and allow it to slow down and strengthen the stem before it breaks. But there's a second option – the whole point of a plant is to set seeds and produce more plants like it. So if it is getting enough light to live but not as much as it really needs, the plant will actually speed up its time of flowering and produce seeds quickly. This is a calculated risk – many plants can't self-pollinate. If they can, they are fine and will produce seeds. If they can't then they are depending on other plants near them also flowering early, which isn't that much of a gamble because they're probably light starved too!



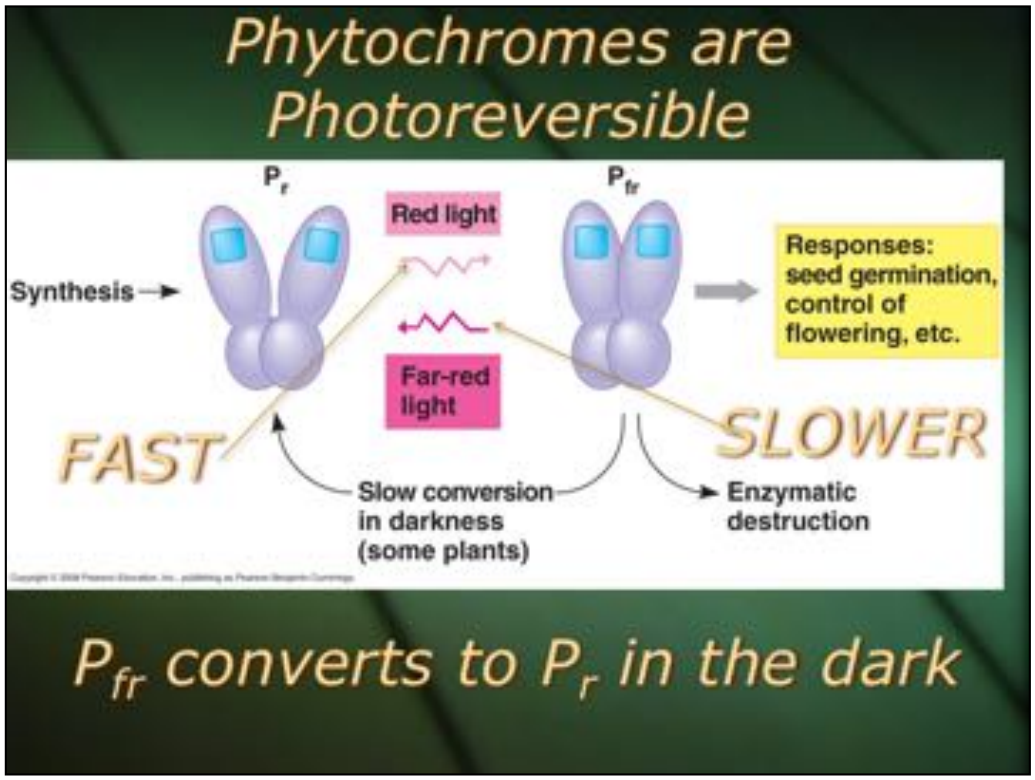
Before exposure to light, a dark-grown potato exhibits morphological adaptations called **etiolation**: few **leaves** enable the **shoots** to penetrate the soil; few **roots** absorb little water, but little water is lost by the shoots.

After a week's exposure to natural daylight, the plant now has **broad green leaves** and **long roots**. this behavior is called **tropism**: a directional response to a stimulus.

On off Switch Pr → Pfr → Pr and so on

Dimmer: Slow conversion of Pfr back to Pr at night; When it's done, you know a night is longer than some minimum.

Short day plant → When

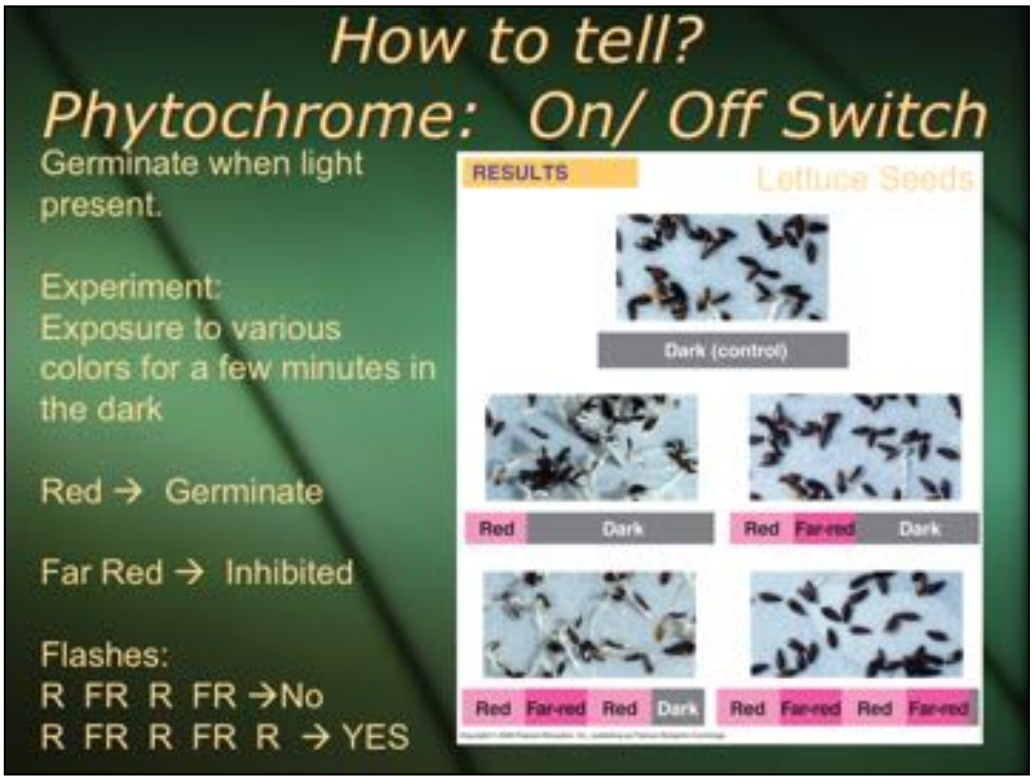


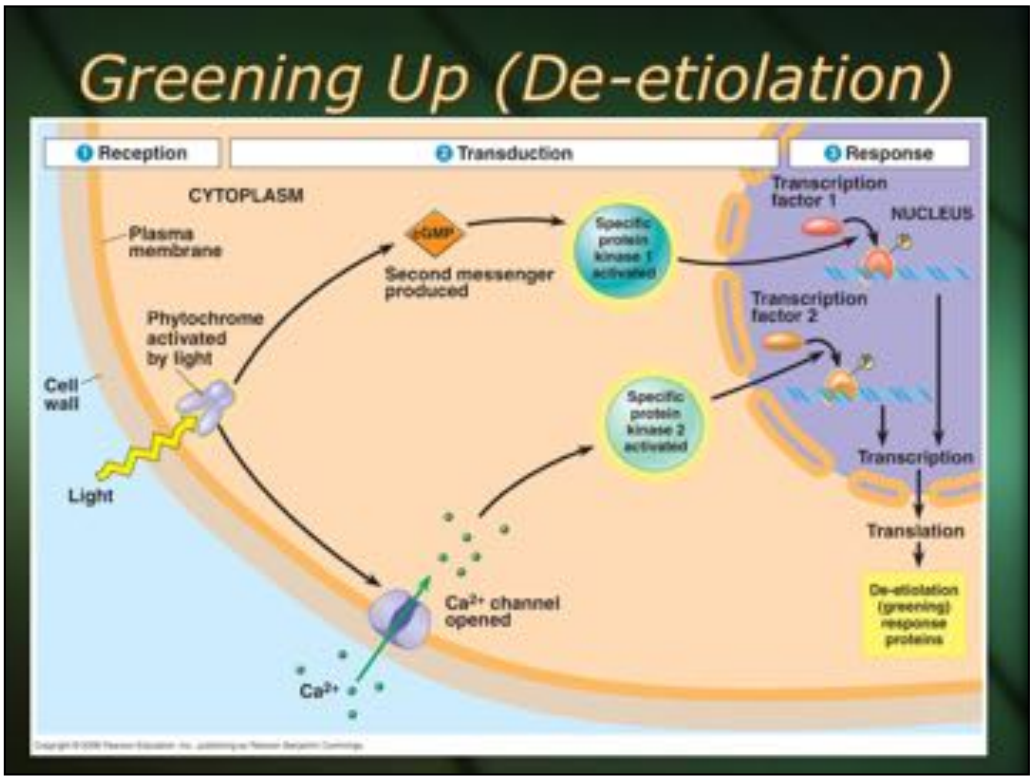
Phytochrome made as Pr →

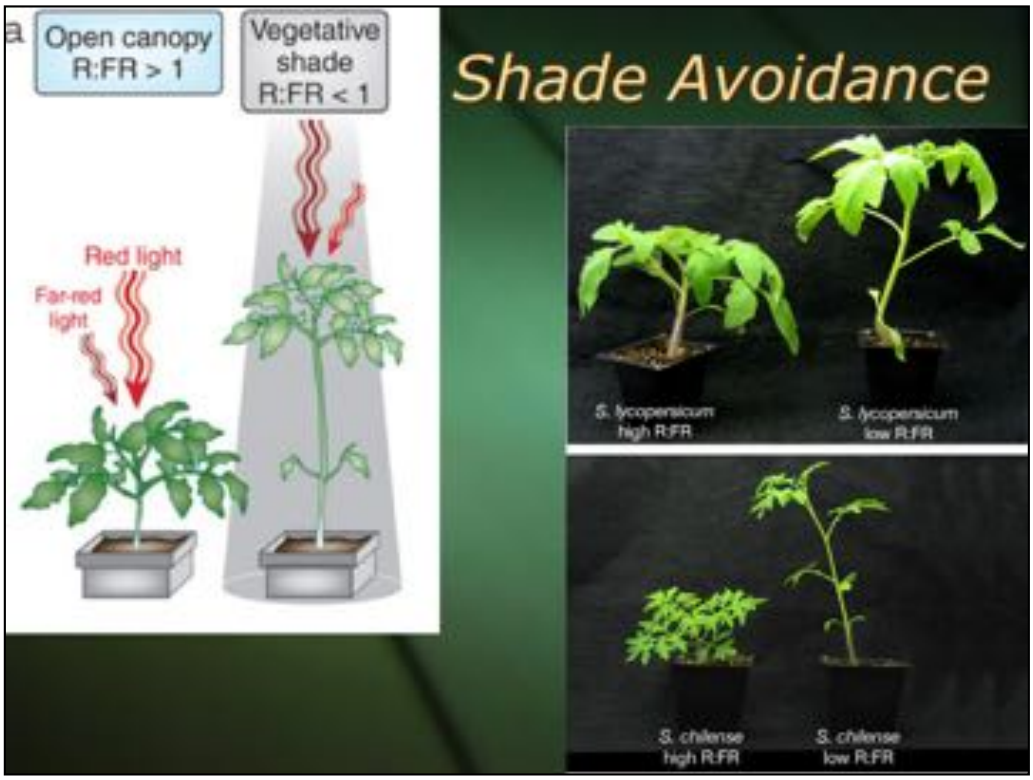
Seed in dark → Pr stays Pr

Light: Pr → Pfr is faster than Pfr → Pr so Pfr accumulates and →

Pfr starts the sequence of events that lead to germination.

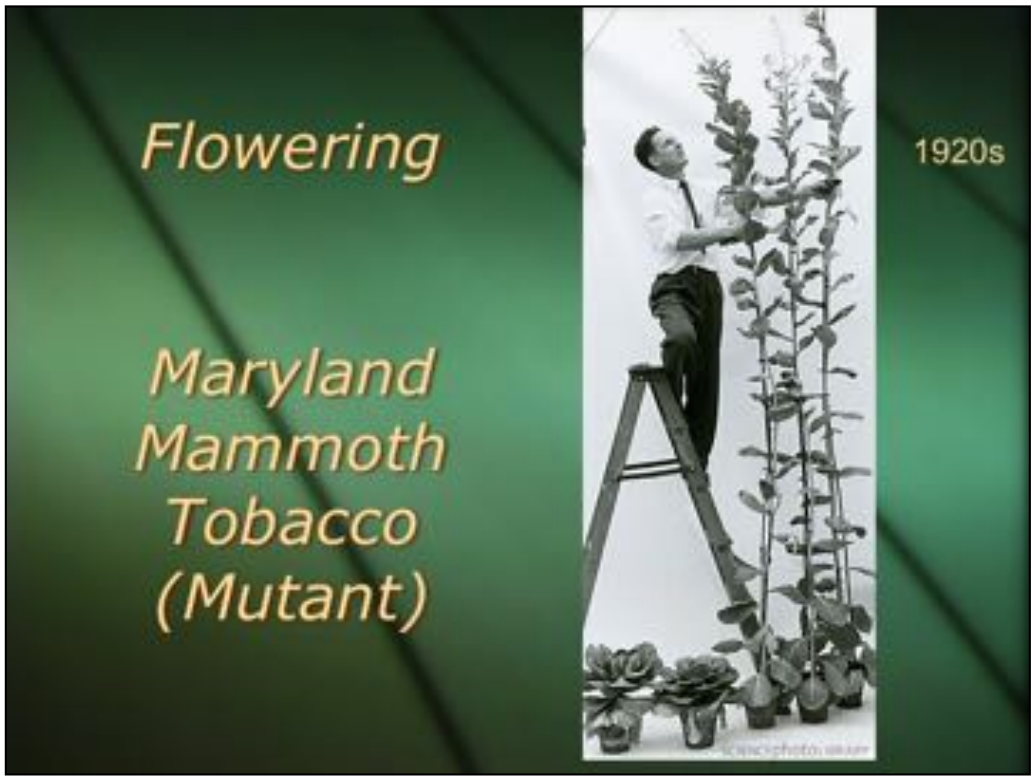

How to tell?
Phytochrome: On/ Off Switch
Germinate when light present.
Experiment:
Exposure to various colors for a few minutes in the dark
Red → Germinate
Far Red → Inhibited
Flashes:
R FR R FR →No
R FR R FR R → YES
RESULTS
Lettuce Seeds
Dark (control)
Red
Dark
Red
Far-red
Dark
Red
Far-red
Red
Dark
Red
Far-red
Red
Far-red


Greening Up (De-etiolation)
1 Reception
2 Transduction
3 Response
CYTOPLASM
Plasma membrane
Second messenger produced
Specific protein kinase 1 activated
Transcription factor 1
NUCLEUS
Transcription factor 2
Phytochrome activated by light
Cell wall
Light
Specific protein kinase 2 activated
Transcription
Translation
De-etiolation (greening) response proteins
Ca2+ channel opened
Ca2+



If a tree that needs lots of sun is shaded by a canopy tree, it will receive much less Red light (the canopy trees leaves absorb Red but not Far Red). Thus Pfr is converted to Pr. This causes the tree to grow taller.

The tree without shading has high Red and Pr is converted to Pfr. Pfr stimulates branching and inhibits vertical growth.



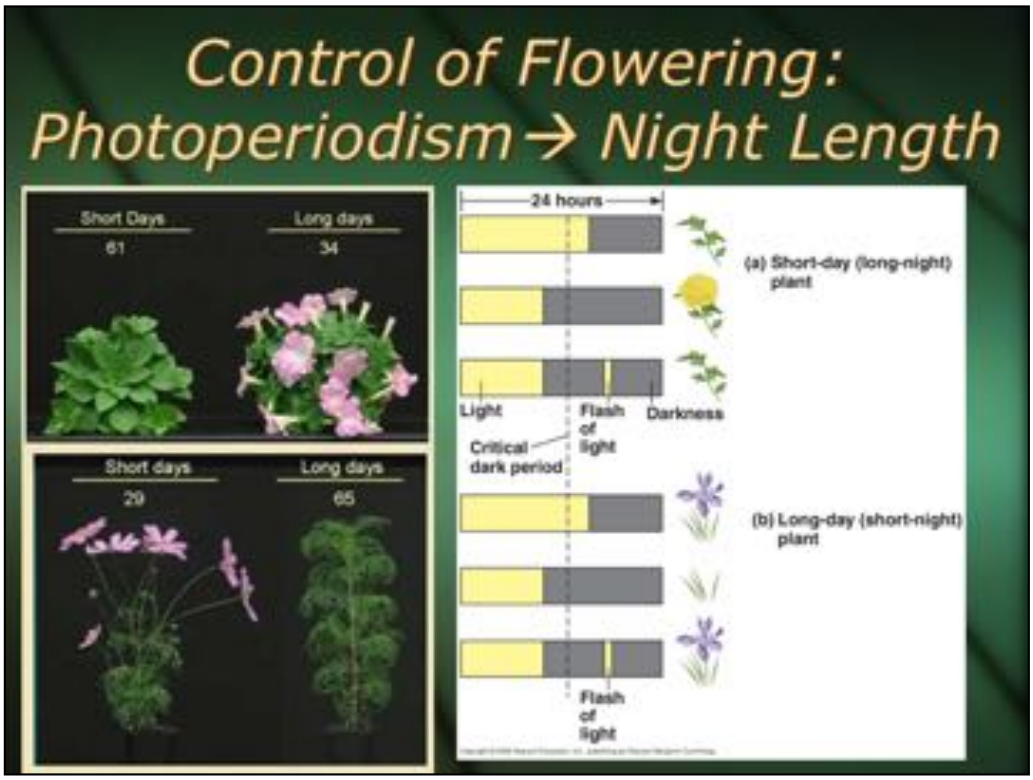
In the early 1920s, two plant breeders, W.W. Garner and H.A. Allard, who worked with the United States Department of Agriculture, ran into a problem. Garner and Allard encountered a mutant tobacco plant (Nicotiana tabacum), called Maryland Mammoth, growing in their experimental plots near Washington,DC. The mammoth plants grew over 10 feet high but, much to the dismay of Garner and Allard, could not be used in breeding experiments because the plants never flowered in the field during the normal growing season. The Maryland Mammoth tobacco would only flower if cuttings were taken and grown in the greenhouse in the winter.

Didn't flower unless brought into a greenhouse where it could be kept warm enough as the days grew shorter.

Kept in a light tight box, manipulate the light -- make the days SHORTER than 14 hours, then it would flower: SHORT DAY PLANT

Short: Chrysanthemum plant, Pointsettias - flower in late summer, fall

Long: Iris, Spinach



Experiments done with cocklebur (short day)

Sunlight is richer in red (660 nm) than far red (730 nm) light so at sundown, all the phytochrome is PFR.

During the night, the PFR converts back to PR.

The PR form is needed for the release of the flowering signal.

Therefore, the cocklebur needs 8.5 hours of darkness in which to

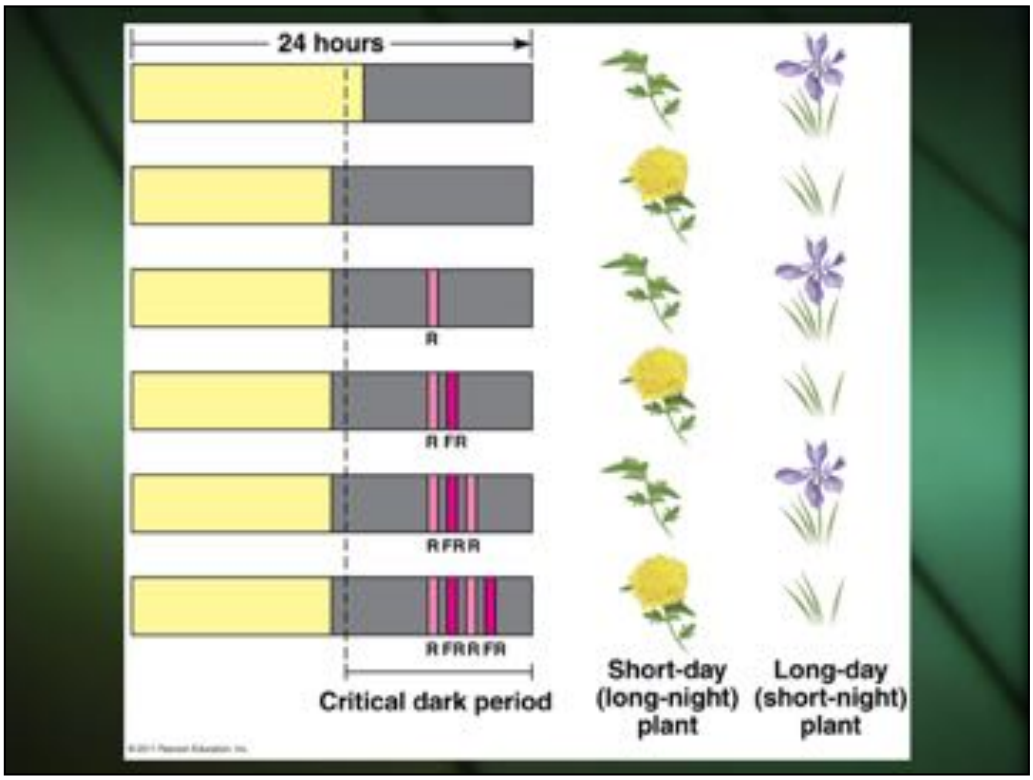
convert all the PFR present at sundown into PR

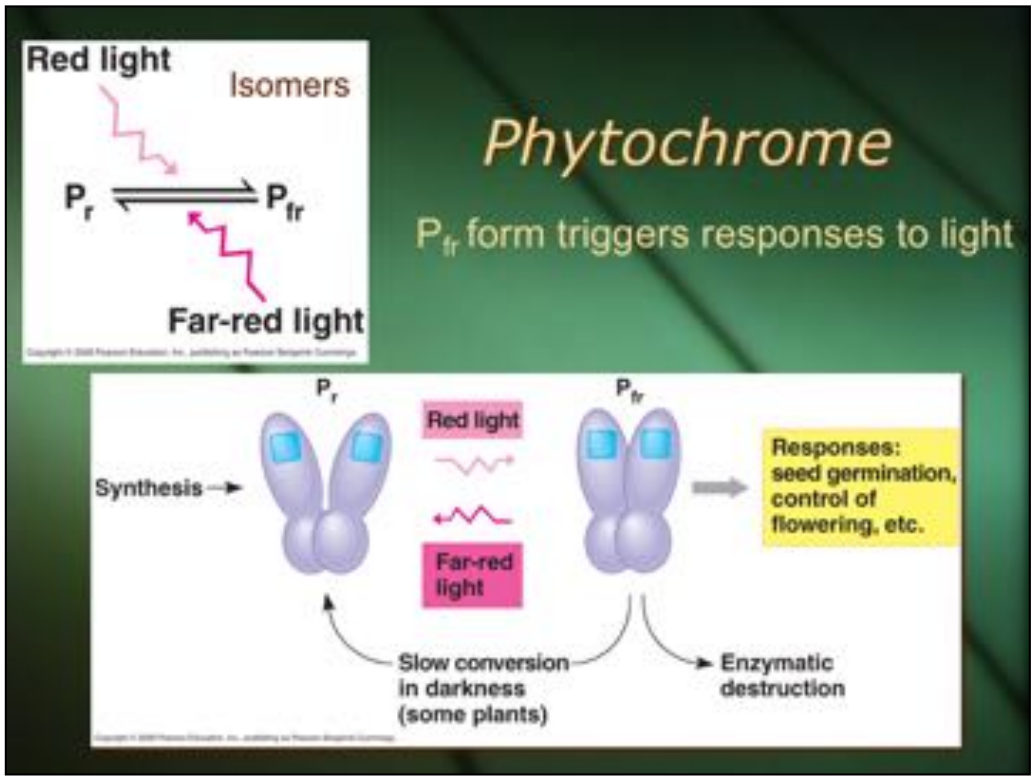
carry out the supplementary reactions leading to the release of the flowering signal ("florigen")

If this process is interrupted by a flash of 660-nm light, the PR is immediately reconverted to PFR and the night's work is undone (C)

A subsequent exposure to far red (730 nm) light converts the pigment back to PR and the steps leading to the release of florigen can be completed (D)

Exposure to intense far red light at the beginning of the night sets the clock ahead about 2 hours or so by eliminating the need for the spontaneous conversion of PFR to PR (E).


24 hours
R
R FR
R FR R
R FR R FR
Critical dark period
Short-day (long-night) plant
Long-day (short-night) plant



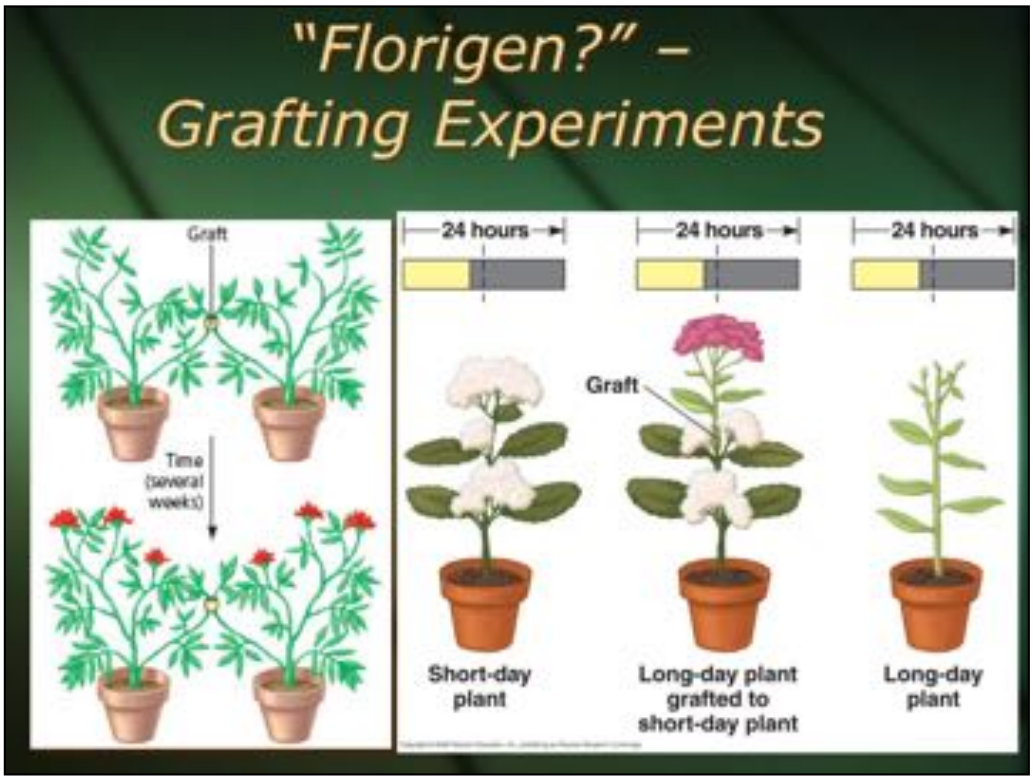
Sunlight has Pr & Pfr but

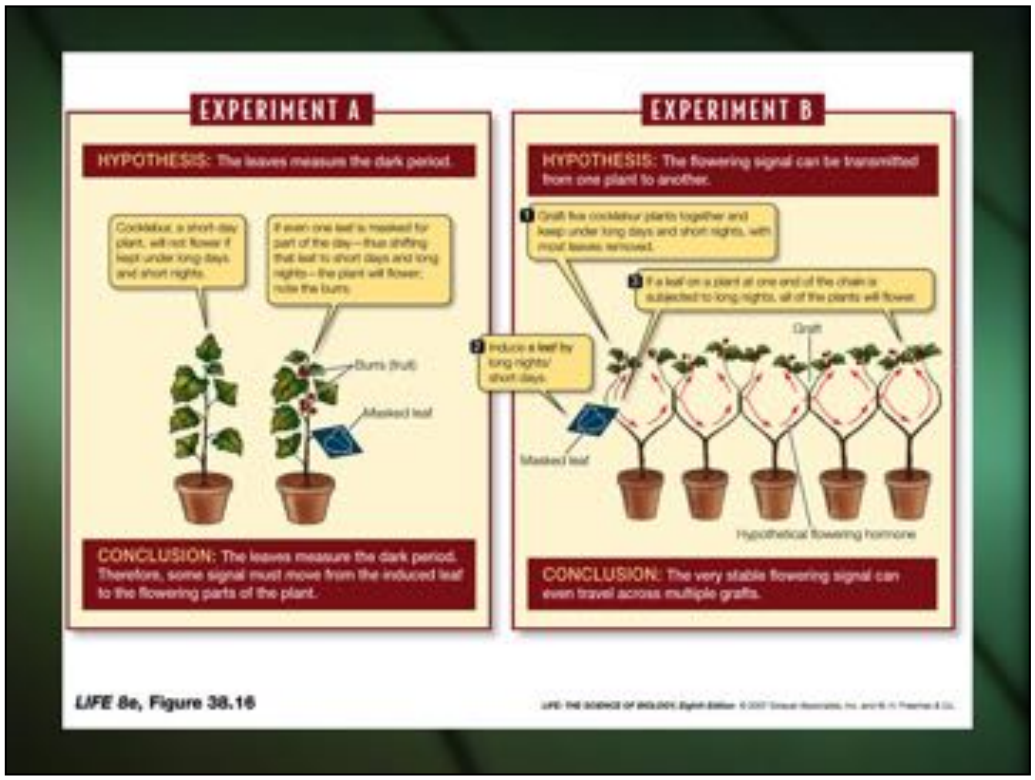
Pr is converted to Pfr faster than the reverse. So, ratio of Pfr to Pf increases in sun.

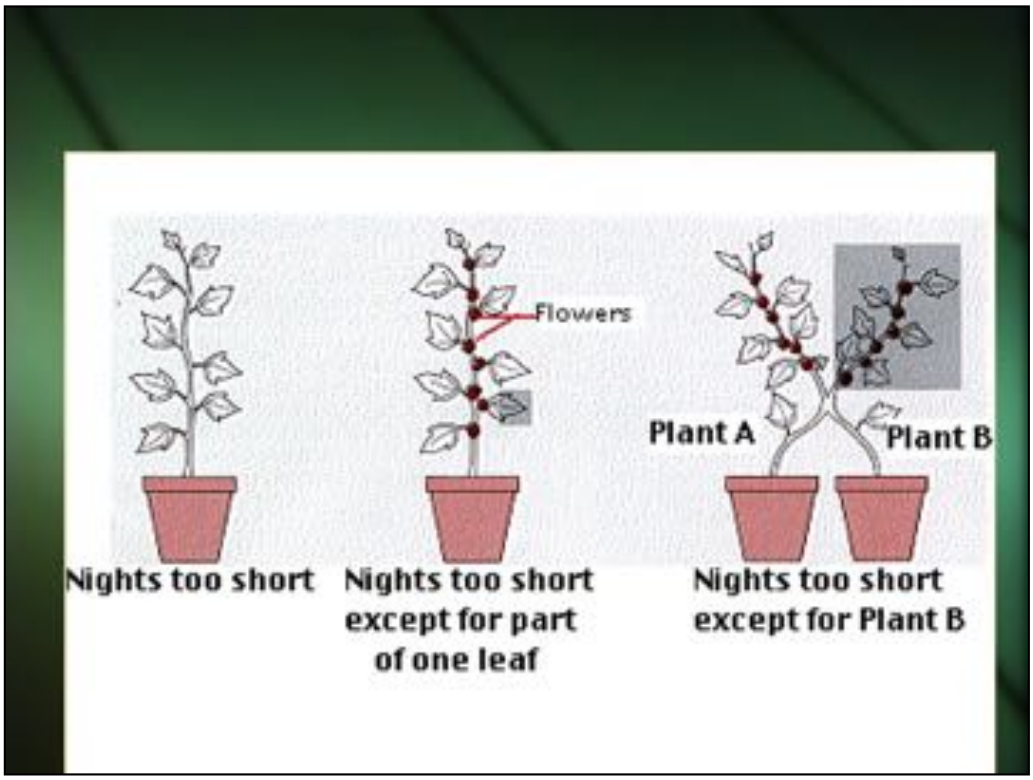
So in sun, Pfr accumulates and can stimulate response (like seed germination). –

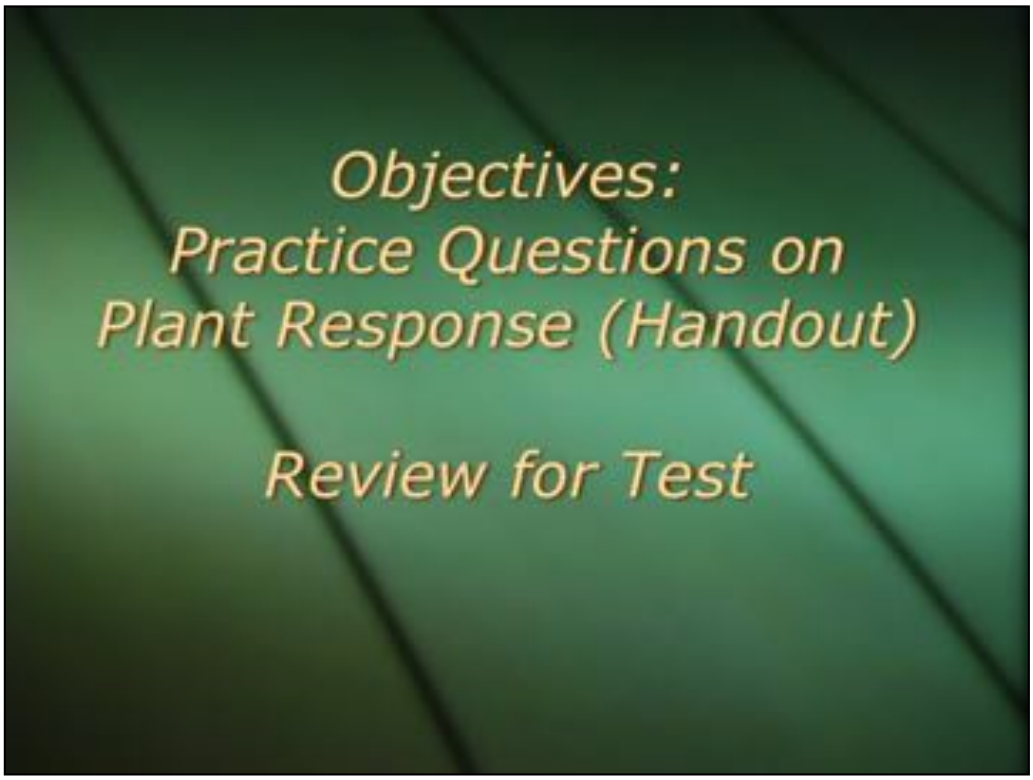
Forest canopy screens out more Pred light than Pfarred light, so Pr form accumulates (Chlorophyll absorbs red wavelengths and not far red)

Direct sun stiulates branching and inhibits vertical growth


"Florigen?" –
Grafting Experiments
Graft
Time
(several
weeks)
24 hours
24 hours
24 hours
Graft
Short-day
plant
Long-day plant
grafted to
short-day plant
Long-day
plant


EXPERIMENT A
HYPOTHESIS: The leaves measure the dark period.
Cocklebur, a short-day plant, will not flower if kept under long days and short nights.
If even one leaf is masked for part of the day—thus shifting that leaf to short days and long nights—the plant will flower; note the burrs.
Burrs (fruit)
Masked leaf
CONCLUSION: The leaves measure the dark period. Therefore, some signal must move from the induced leaf to the flowering parts of the plant.
EXPERIMENT B
HYPOTHESIS: The flowering signal can be transmitted from one plant to another.
1 Graft five cocklebur plants together and keep under long days and short nights, with most leaves removed.
3 If a leaf on a plant at one end of the chain is subjected to long nights, all of the plants will flower.
Graft
2 Induce a leaf by long nights/ short days.
Masked leaf
Hypothetical flowering hormone
CONCLUSION: The very stable flowering signal can even travel across multiple grafts.
LIFE 8e, Figure 38.16


Flowers
Plant A
Plant B
Nights too short
Nights too short except for part of one leaf
Nights too short except for Plant B


Objectives:
Practice Questions on
Plant Response (Handout)
Review for Test