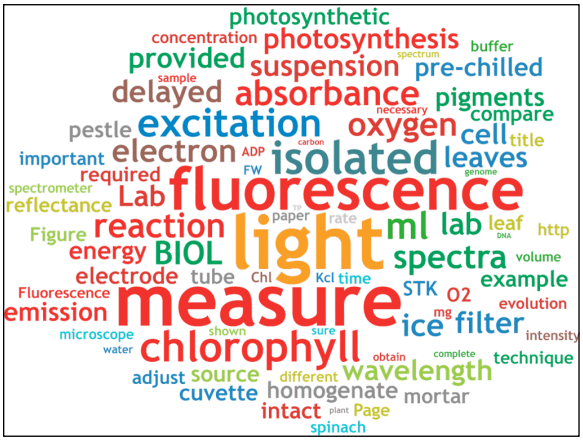
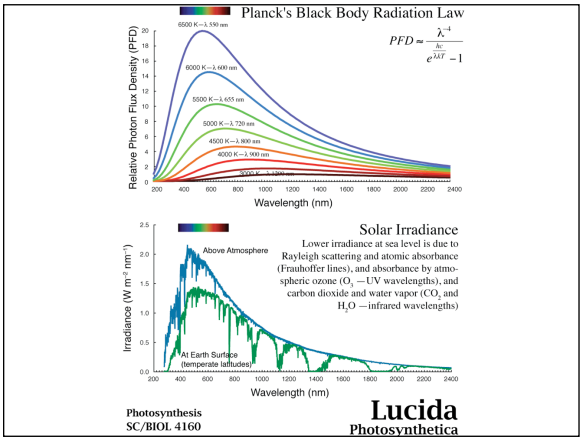
SC/BIOL 4160
Photosynthesis

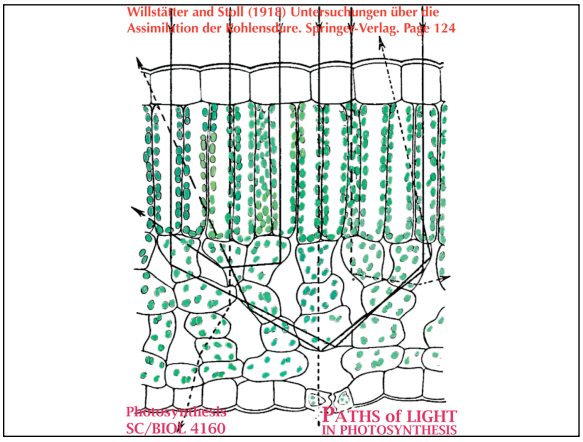
To explain what a laboratory is would be like trying to explain what music is to a person who has never listened to music. One learns in a laboratory; one learns how to make experiments only by experimenting; and one learns how to work with his hands only by using them.

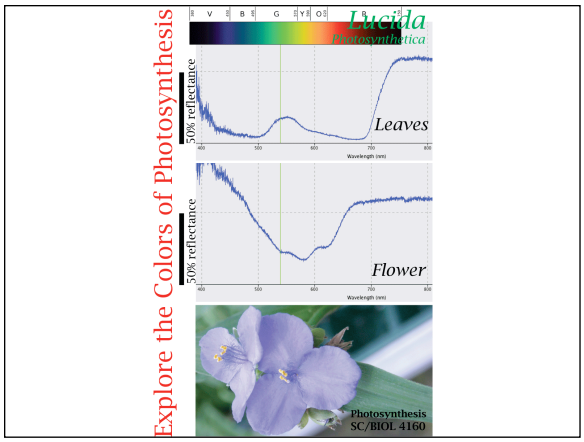
G. Toraldo Di Francia
The Investigation of the Physical World

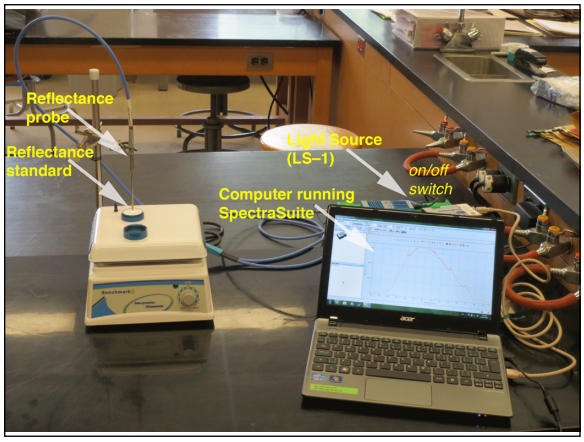
artwork by Michael Hagelberg

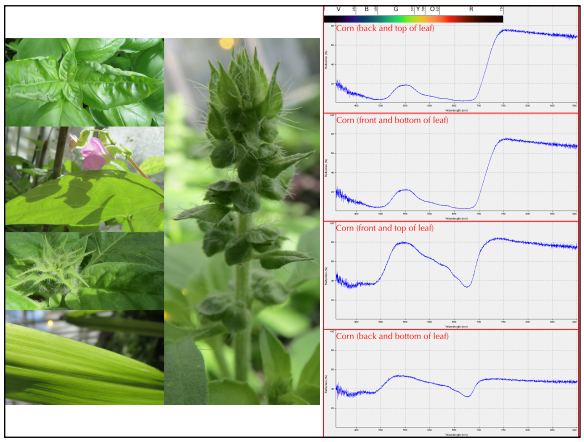


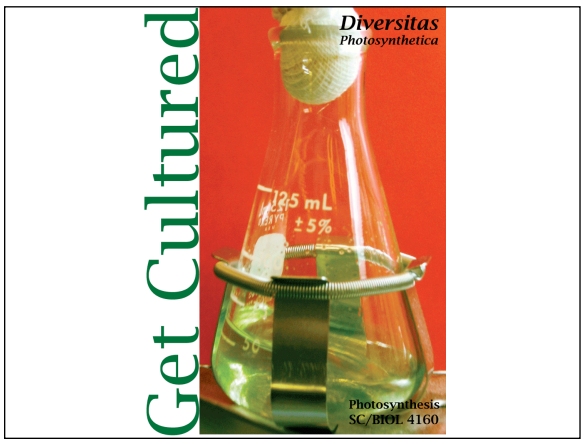


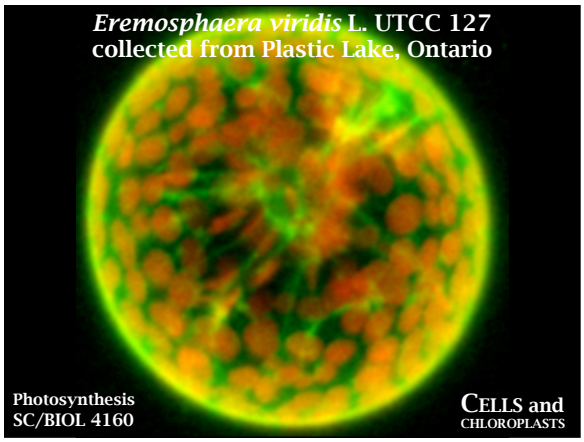


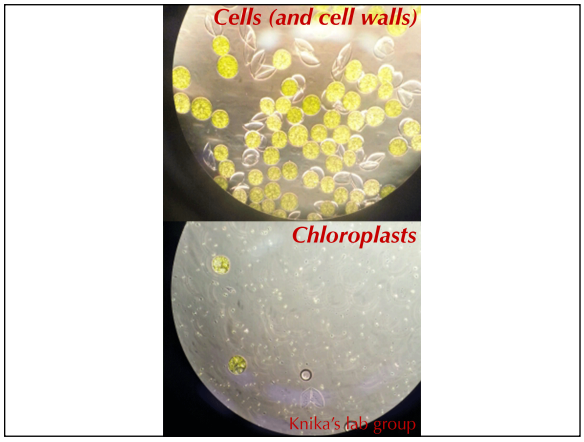

Explore the Colors of Photosynthesis
Lucida
Photosynthetica
50% reflectance
Leaves
50% reflectance
Flower
Photosynthesis
SC/BIOL 4160

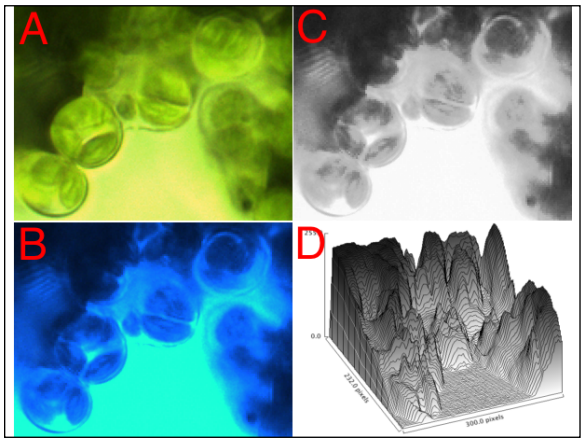

Reflectance probe
Reflectance standard
Light Source (LS–1)
on/off switch
Computer running SpectraSuite

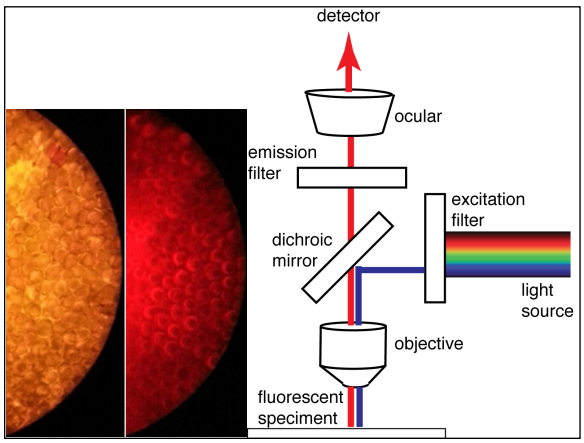

Corn (back and top of leaf)
Corn (front and bottom of leaf)
Corn (front and top of leaf)
Corn (back and bottom of leaf)

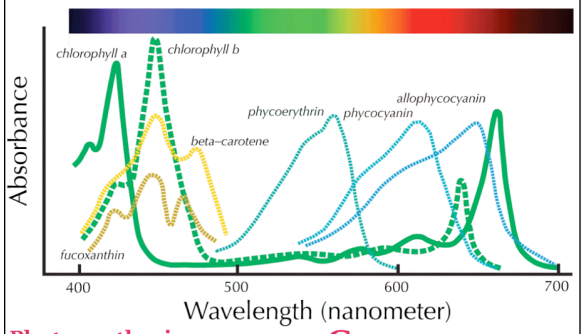

Get Cultured
Diversitas
Photosynthetica
125 mL
± 5%
Photosynthesis
SC/BIOL 4160


Eremosphaera viridis L. UTCC 127
collected from Plastic Lake, Ontario
Photosynthesis
SC/BIOL 4160
CELLS and
CHLOROPLASTS


Cells (and cell walls)
Chloroplasts
Knika's lab group


A
C
B
D


detector
ocular
emission
filter
excitation
filter
dichroic
mirror
light
source
objective
fluorescent
speciment



Photosynthesis
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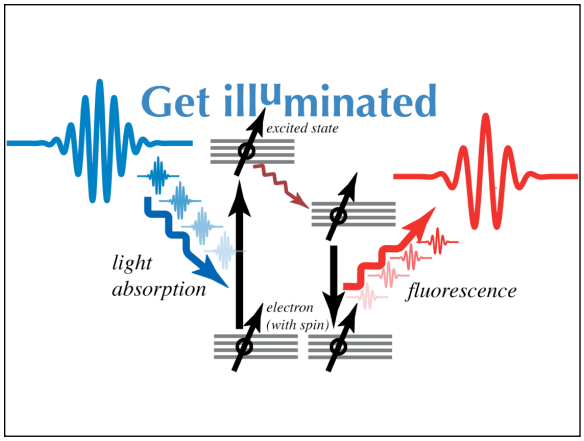
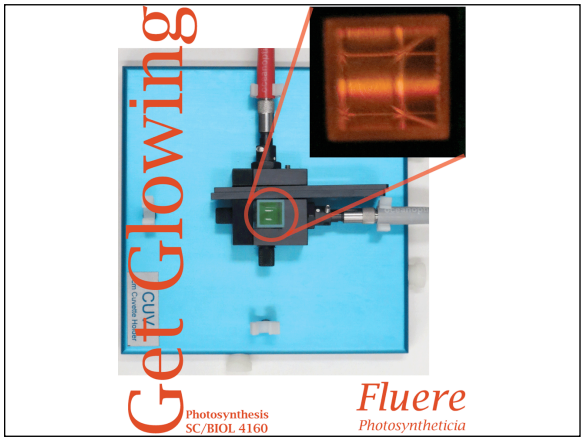
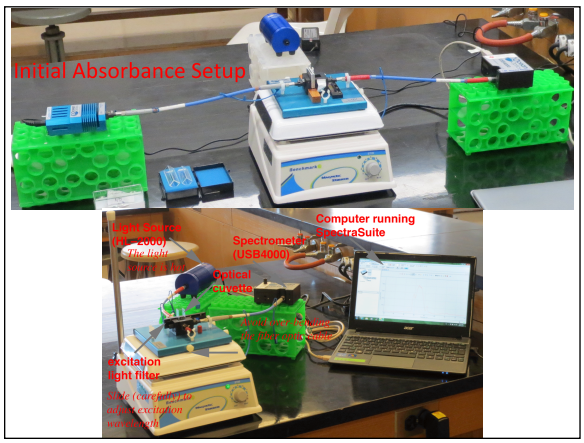
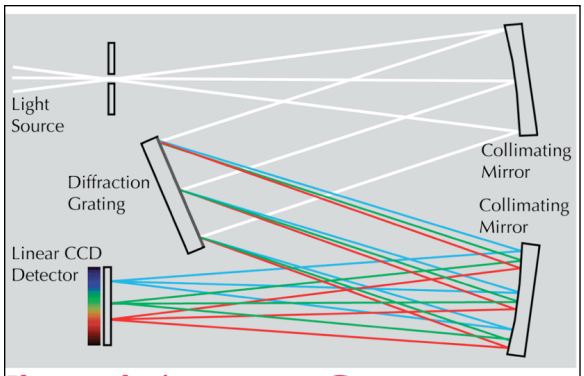
COLORS of LIGHT IN PHOTOSYNTHESIS



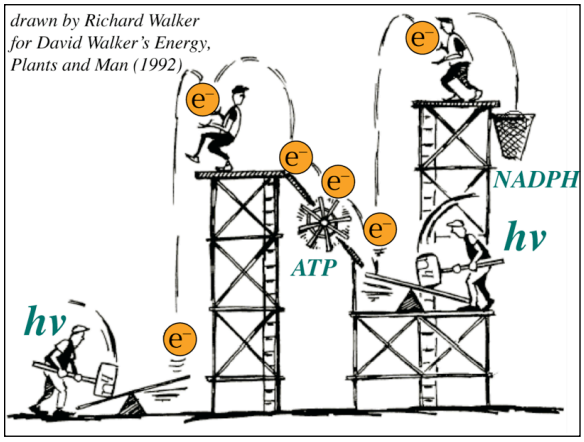


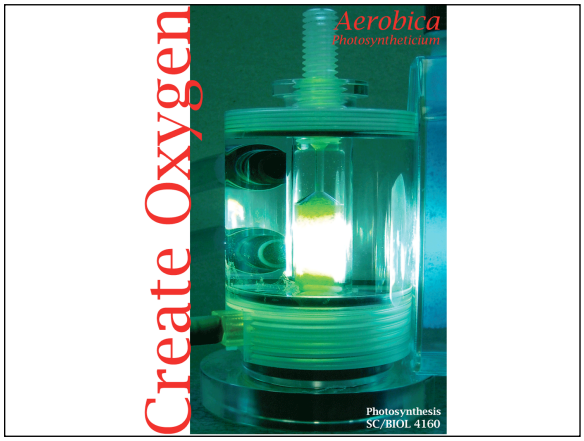


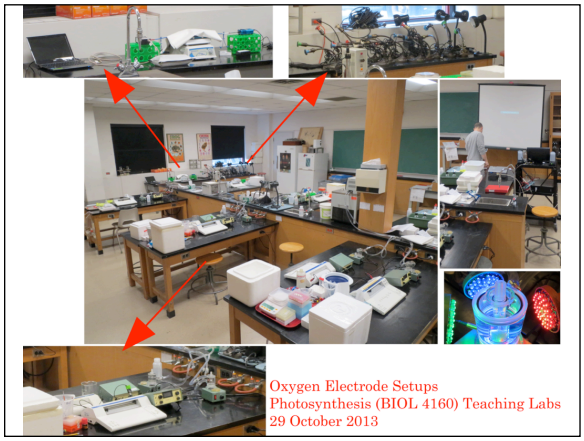


Photosynthesis
SC/BIOL 4160

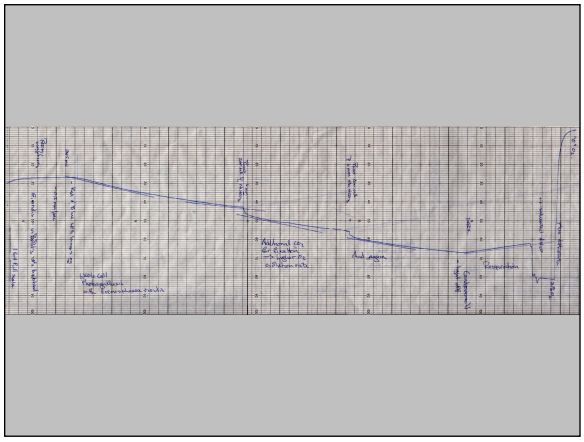
COLORS of LIGHT
IN PHOTOSYNTHESIS

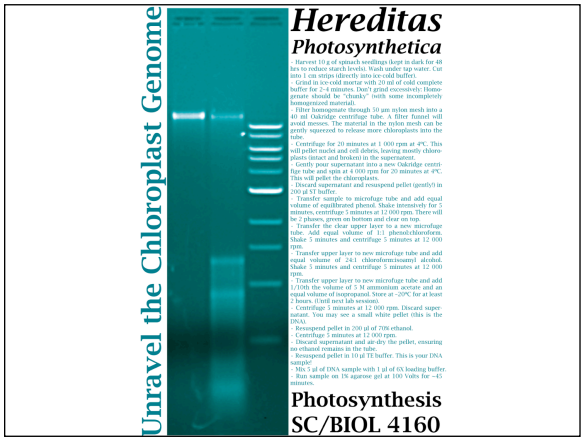


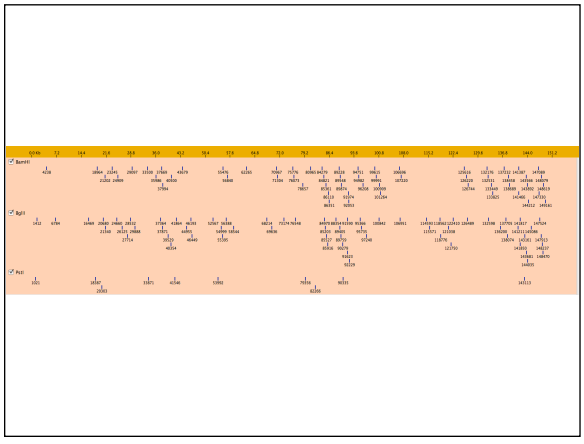


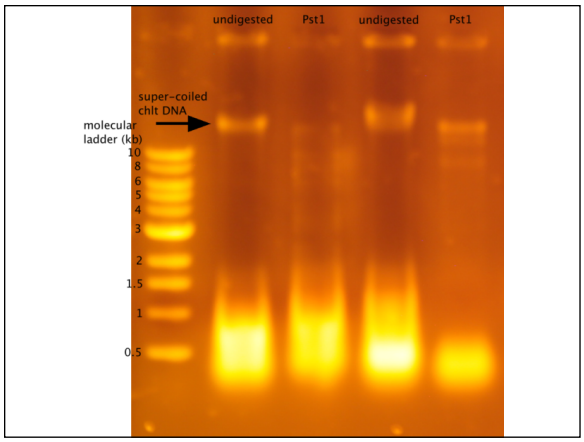


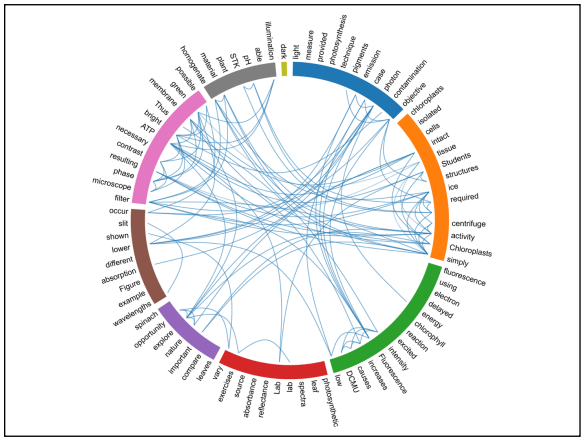
Oxygen Electrode Setups
Photosynthesis (BIOL 4160) Teaching Labs
29 October 2013




Unravel the Chloroplast Genome
Hereditas
Photosynthetica
- Harvest 10 g of spinach seedlings (kept in dark for 48 hrs to reduce starch levels). Wash under tap water. Cut into 1 cm strips (directly into ice-cold buffer).
- Grind in ice-cold mortar with 20 ml of cold complete buffer for 2–4 minutes. Don't grind excessively; Homogenate should be "chunky" (with some incompletely homogenized material).
- Filter homogenate through 10 µm nylon mesh into a 50 ml Oakridge centrifuge tube. A filter funnel will avoid messes. The material in the nylon mesh can be gently squeezed to release more chloroplasts into the tube.
- Centrifuge for 20 minutes at 1 000 rpm at 4ºC. This will pellet nuclei and cell debris, leaving mostly chloroplasts (intact and broken) in the supernatant.
- Gently pour supernatant into a new Oakridge centrifuge tube and spin at 4 000 rpm for 20 minutes at 4ºC. This will pellet the chloroplasts.
- Discard supernatant and resuspend pellet (gently!) in 200 µl ST buffer.
- Transfer sample to microfuge tube and add equal volume of equilibrated phenol. Shake intensively for 5 minutes, centrifuge 5 minutes at 12 000 rpm. There will be 2 phases, green on bottom and clear on top.
- Transfer the clear upper layer to a new microfuge tube. Add equal volume of 1:1 phenol:chloroform. Shake 5 minutes and centrifuge 5 minutes at 12 000 rpm.
- Transfer upper layer to new microfuge tube and add equal volume of 24:1 chloroform:isoamyl alcohol. Shake 5 minutes and centrifuge 5 minutes at 12 000 rpm.
- Transfer upper layer to new microfuge tube and add 1/10th the volume of 5 M ammonium acetate and an equal volume of isopropanol. Store at -20ºC for at least 2 hours. (Until next lab session).
- Centrifuge 5 minutes at 12 000 rpm. Discard supernatant. You may see a small white pellet (this is the DNA).
- Resuspend pellet in 200 µl of 70% ethanol.
- Centrifuge 5 minutes at 12 000 rpm.
- Discard supernatant and air-dry the pellet, ensuring no ethanol remains in the tube.
- Resuspend pellet in 10 µl TE buffer. This is your DNA sample!
- Mix 5 µl of DNA sample with 1 µl of 6X loading buffer.
- Run sample on 1% agarose gel at 100 Volts for ~45 minutes.
Photosynthesis
SC/BIOL 4160







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