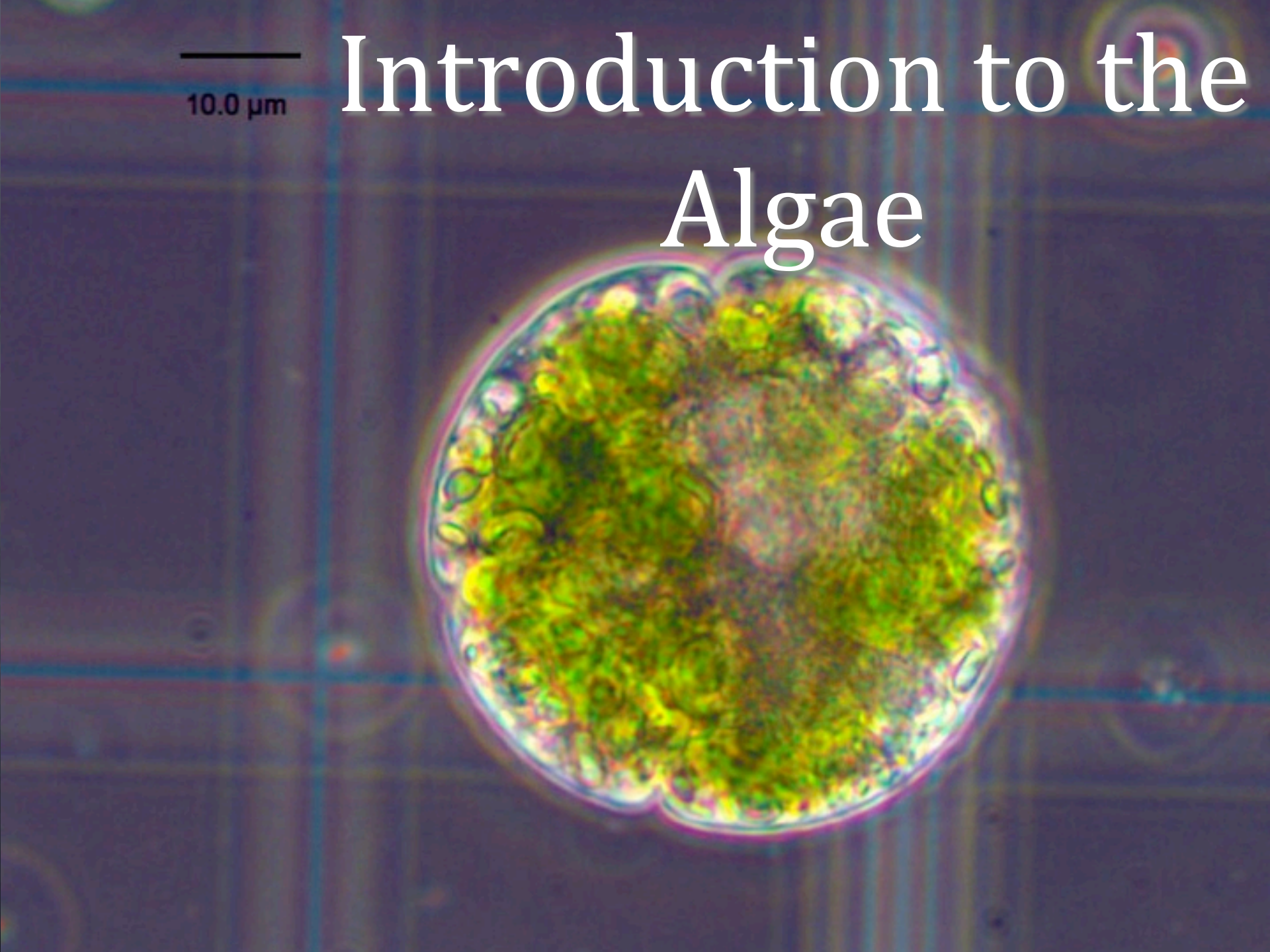
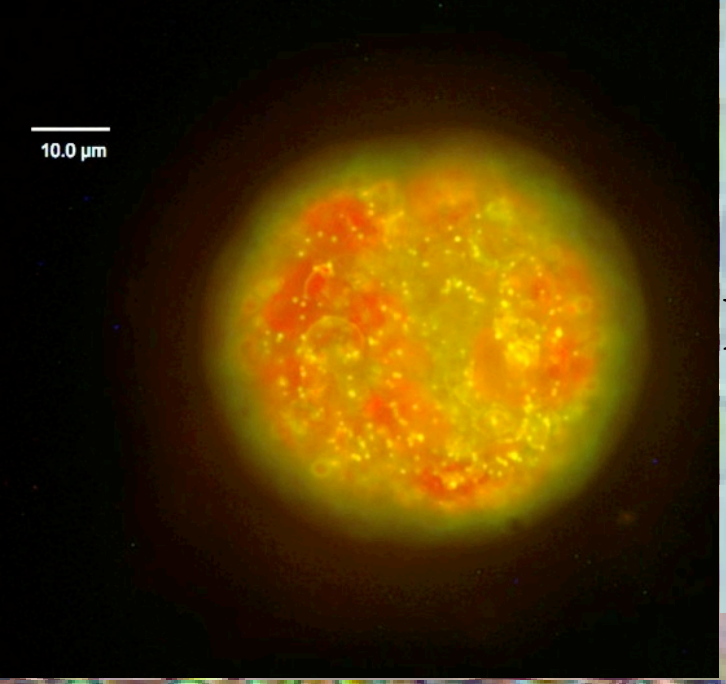
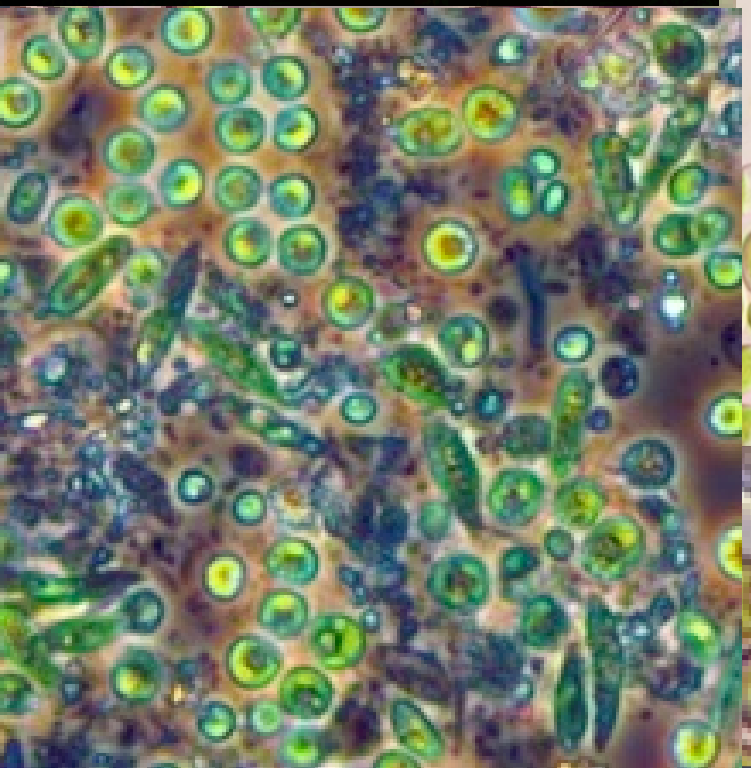
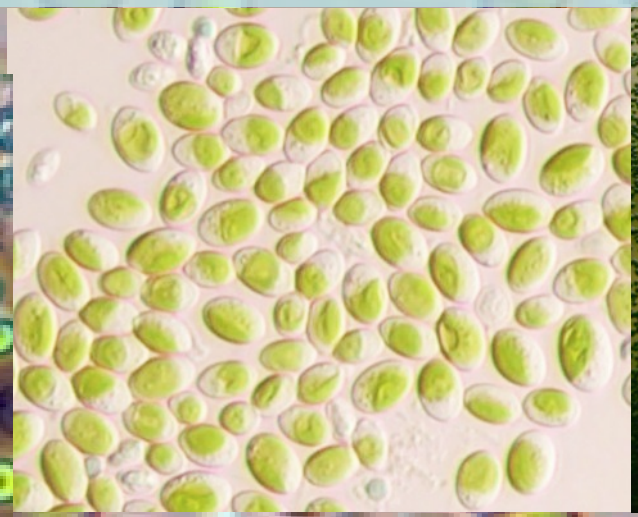
Introduction to the Algae

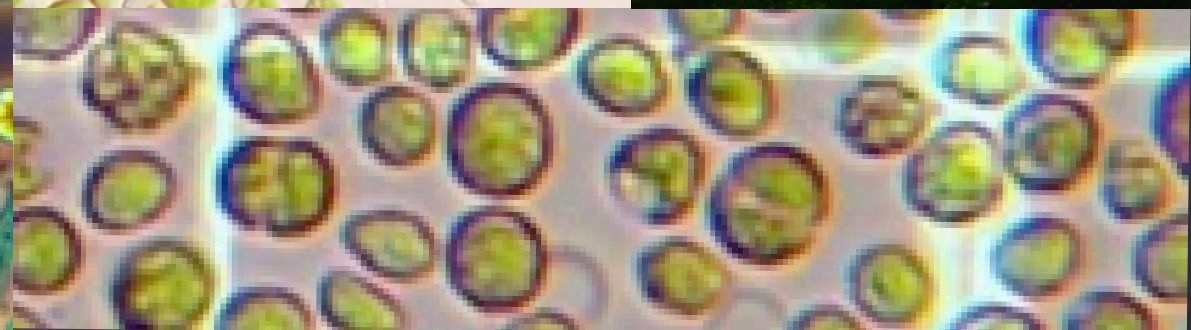




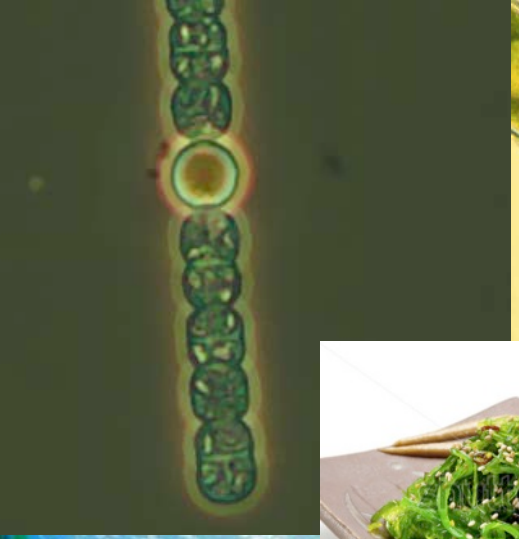
Algae : a catch-all phrase referring to any of the micro and macroscopic plants that lack true leaves, roots, and stems. Ranging in size from single-cells to giant kelps.



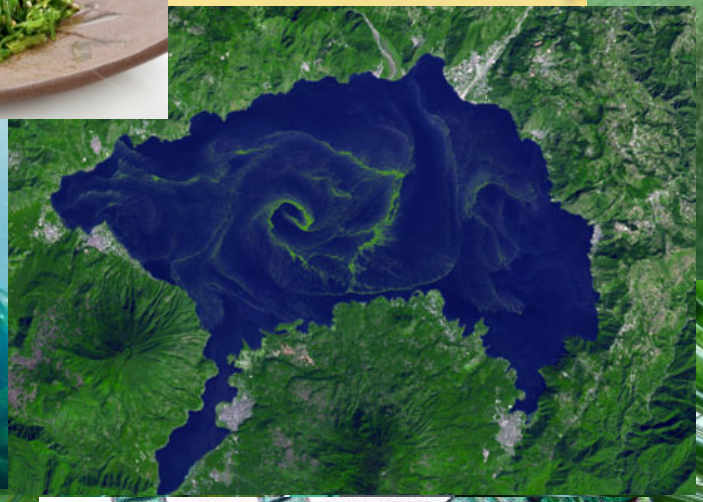


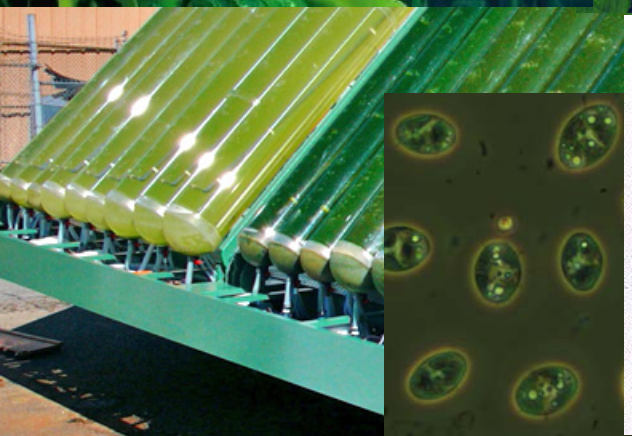


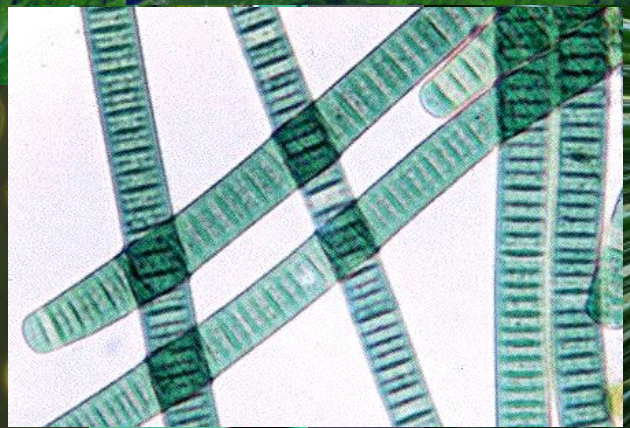
ALGAE!





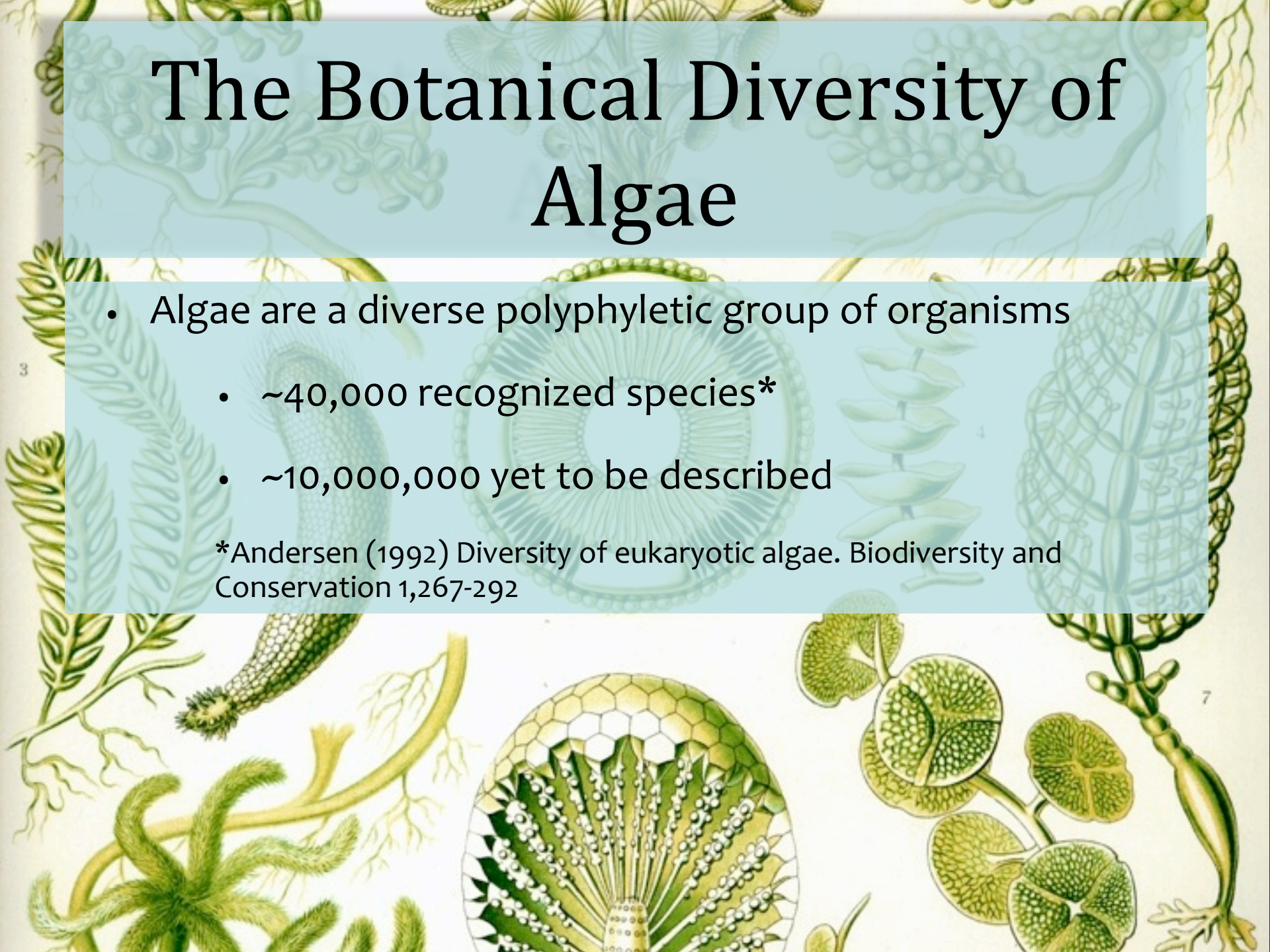




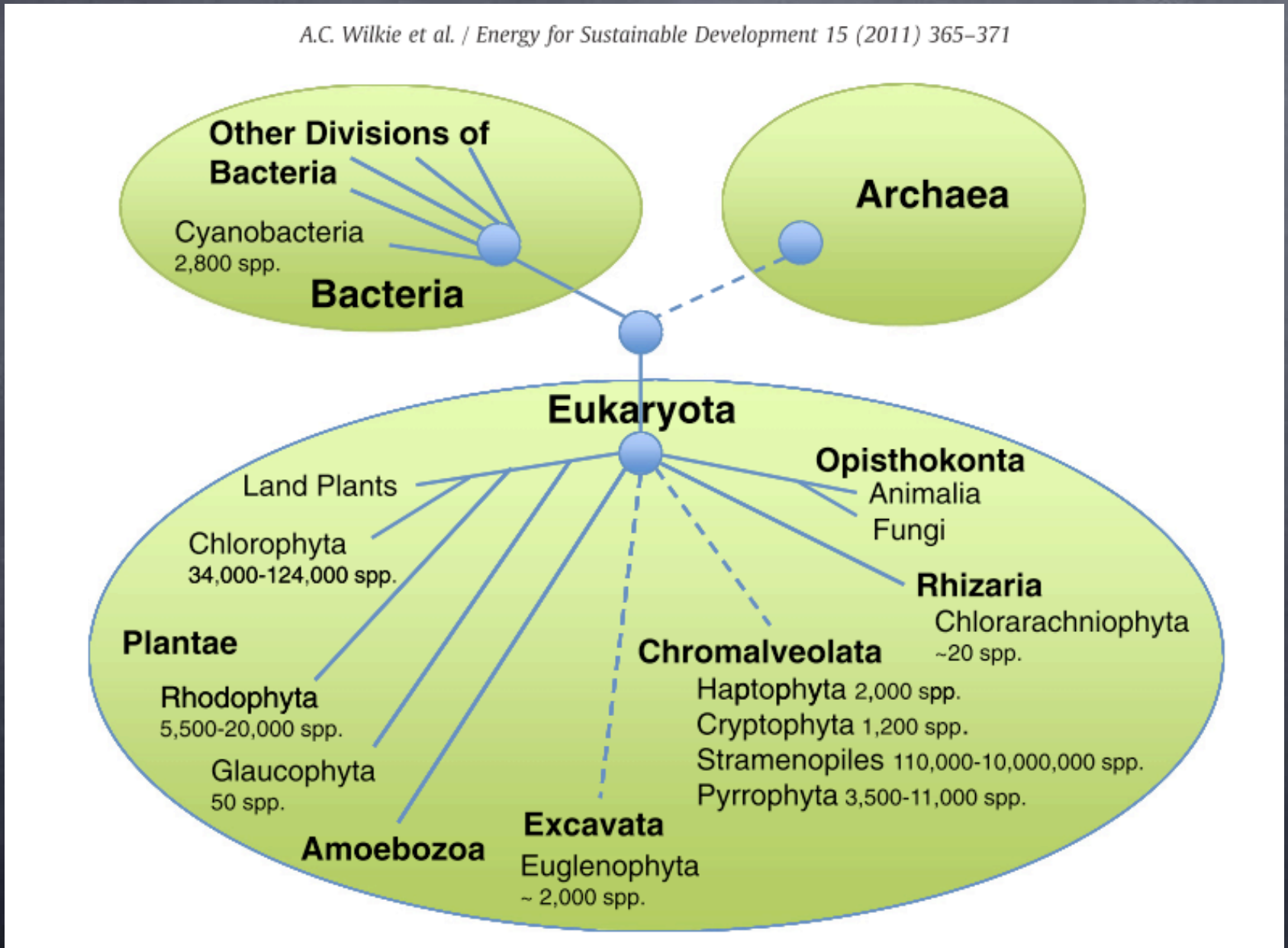
The Botanical Diversity of Algae

- Algae are a diverse polyphyletic group of organisms
  - ~40,000 recognized species*
  - ~10,000,000 yet to be described

*Andersen (1992) Diversity of eukaryotic algae. Biodiversity and Conservation 1,267-292



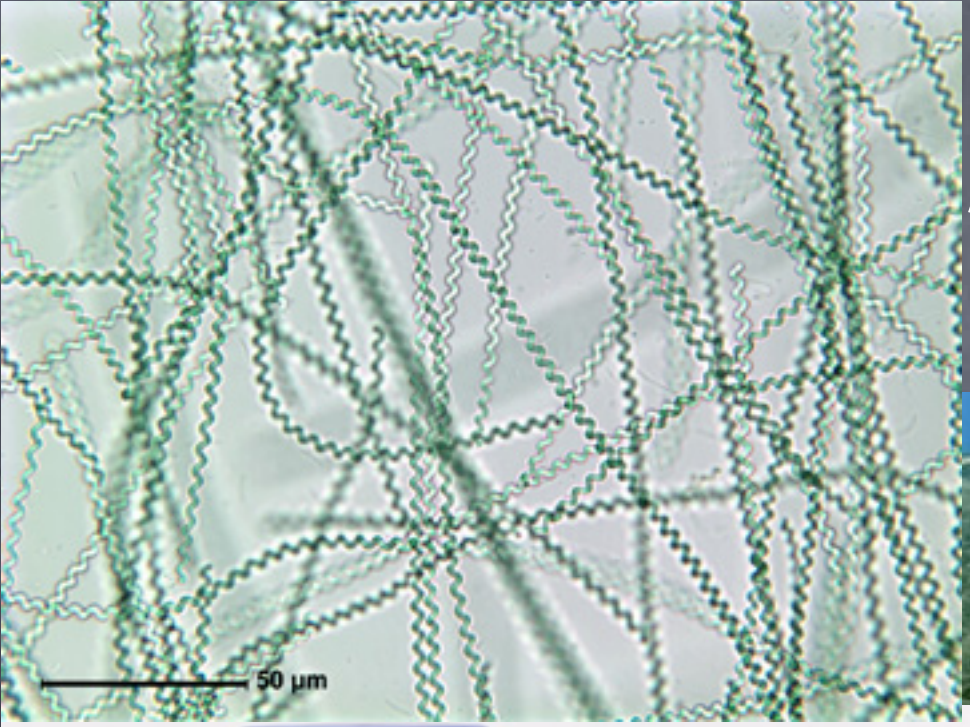
Polyphyletic



Current Global Production

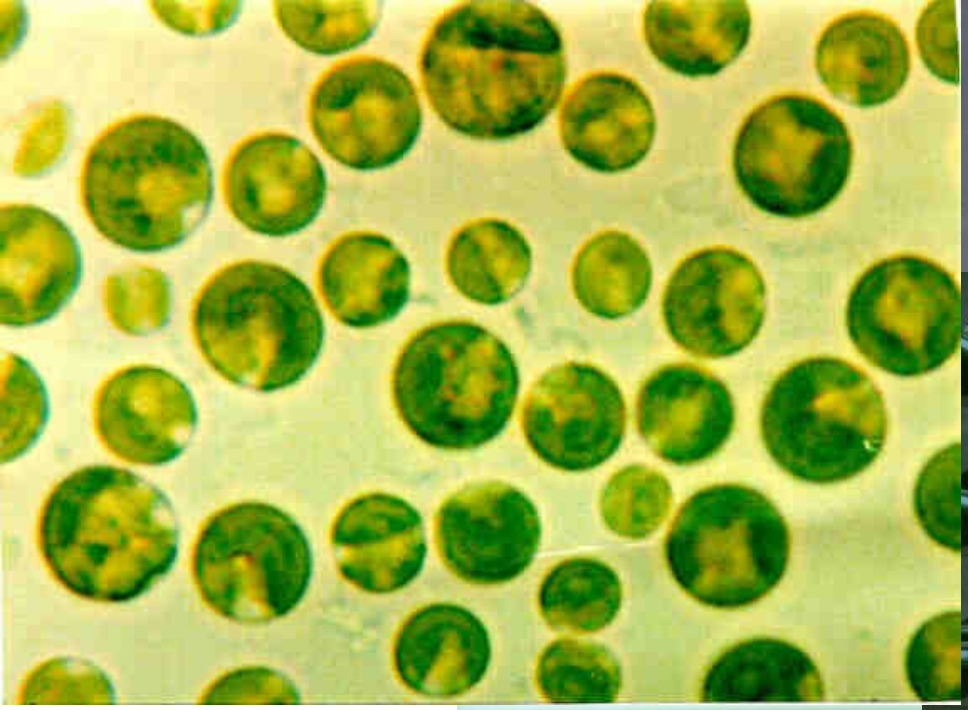
Alga[a]/crop[b]	Division	Annual production
Spirulina	Cyanophyta (cyanobacteria)	3000 tonnes dry weight
Chlorella	Chlorophyta (green algae)	2000 tonnes dry weight
Dunaliella salina	Chlorophyta (green algae)	1200 tonnes dry weight
Aphanizomenon flos-aquae	Cyanophyta (cyanobacteria)	500 tonnes dry weight
Haematococcus pluvialis	Chlorophyta (green algae)	300 tonnes dry weight
Crypthecodinium cohnii	Pyrrophyta (dinoflagellates)	240 tonnes DHA oil
Schizochytrium spp.	Labyrinthista	10 tonnes DHA oil
Zea mays (Maize)	Magnoliophyta (flowering plants)	798×10^6 tonnes dry weight
Glycine max (Soya)	Magnoliophyta (flowering plants)	212×10^6 tonnes dry weight

Spirulina


50 µm

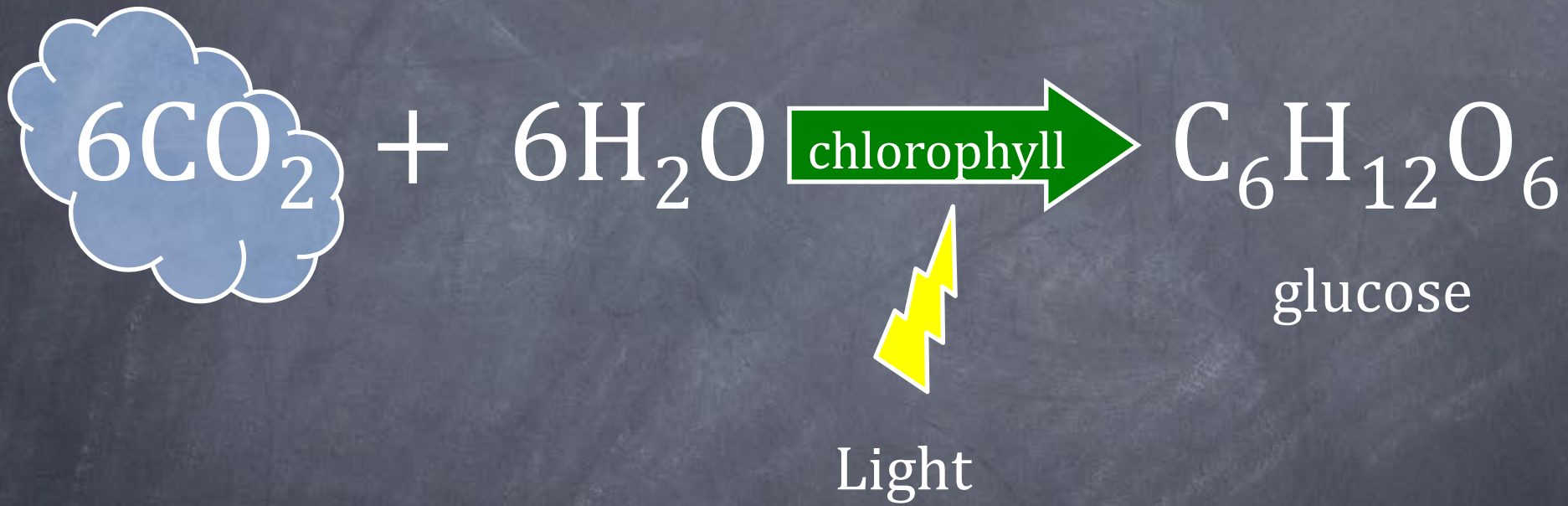

EARTHRISE
Spirulina Natural
Green Superfood for Longevity*
California Grown
300 CAPSULES (600 MG)
EARTHRISE
Spirulina Natural
Green Superfood for Longevity*
California Grown
150 CAPSULES (600 MG)

Chlorella



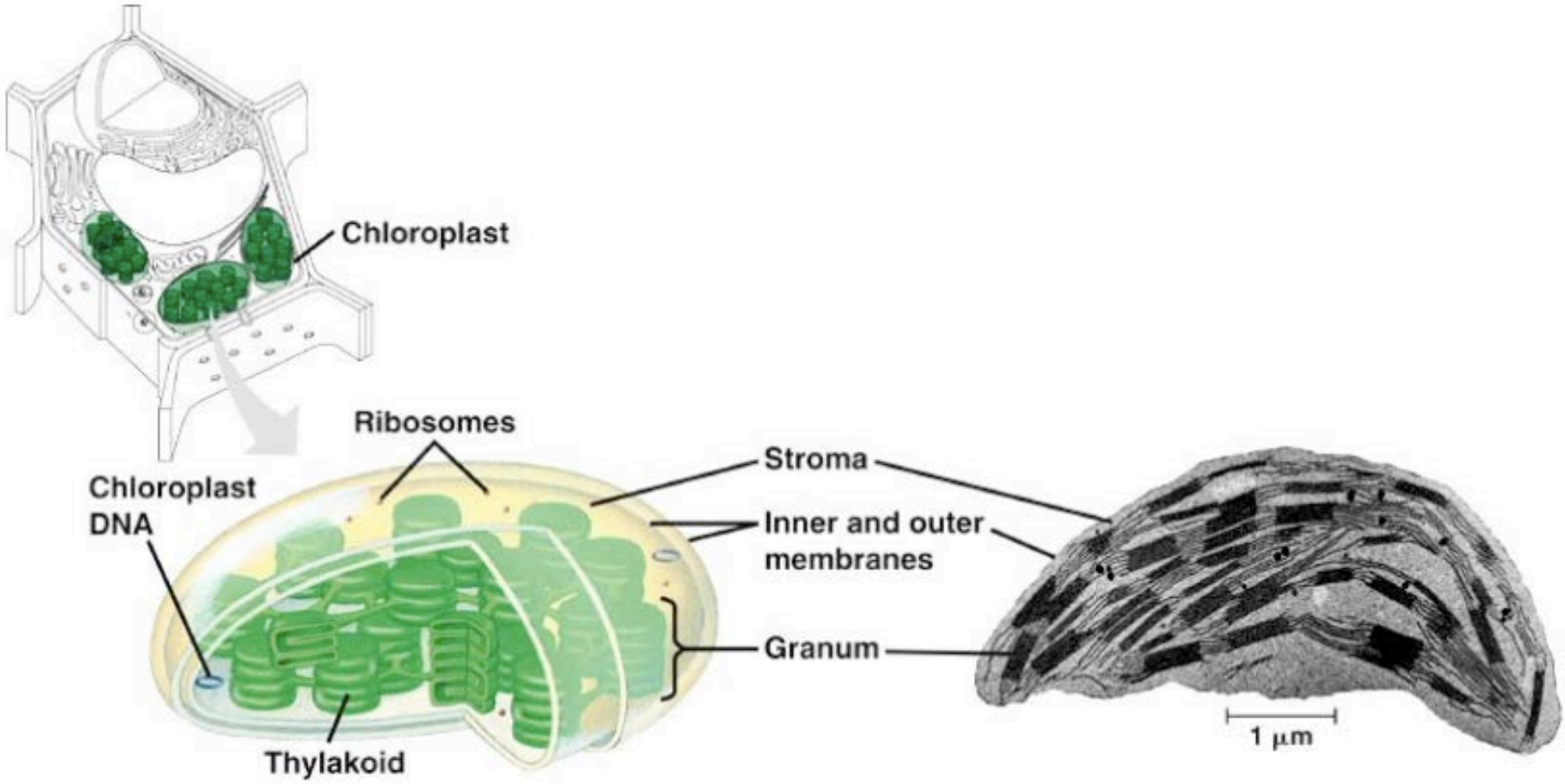

www.lamolina.net
La Molina
FEBICO
ORGANIC
Chlorella A+
100% Organic Chlorella A+
Premium Dietary Supplement
Cracked Cell Wall

Introduction to Photosynthesis



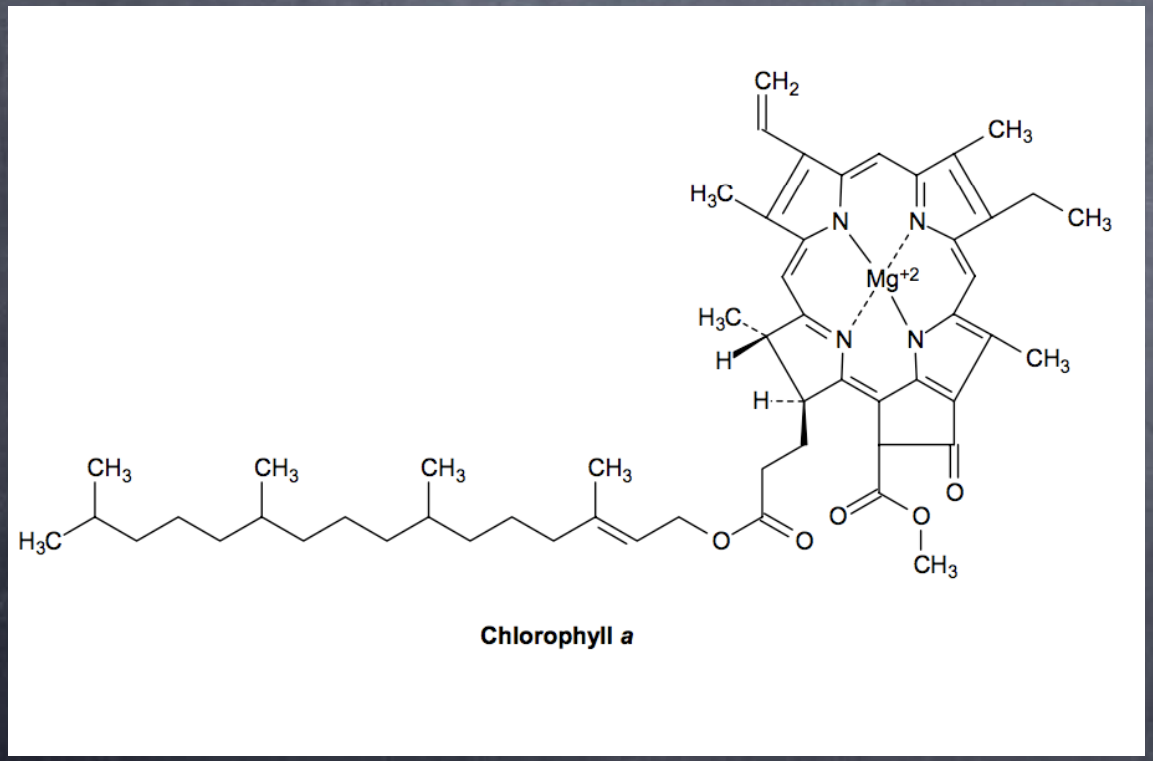
Introduction to Photosynthesis

The Chloroplast: where all the action takes place

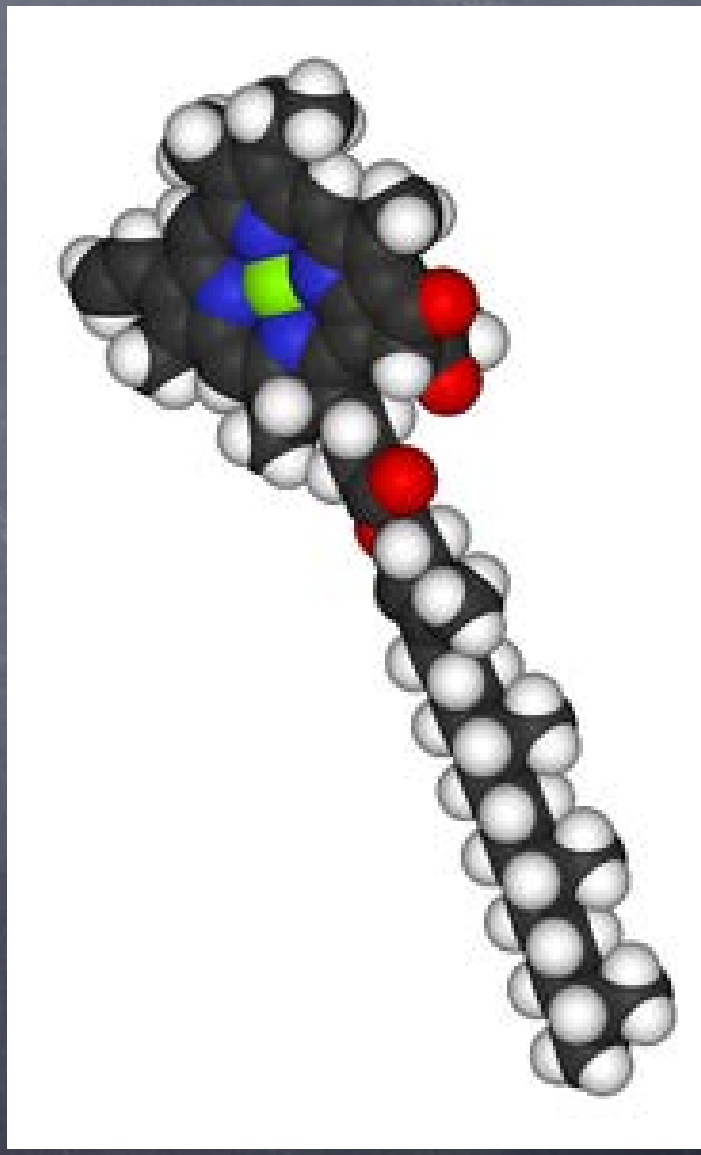


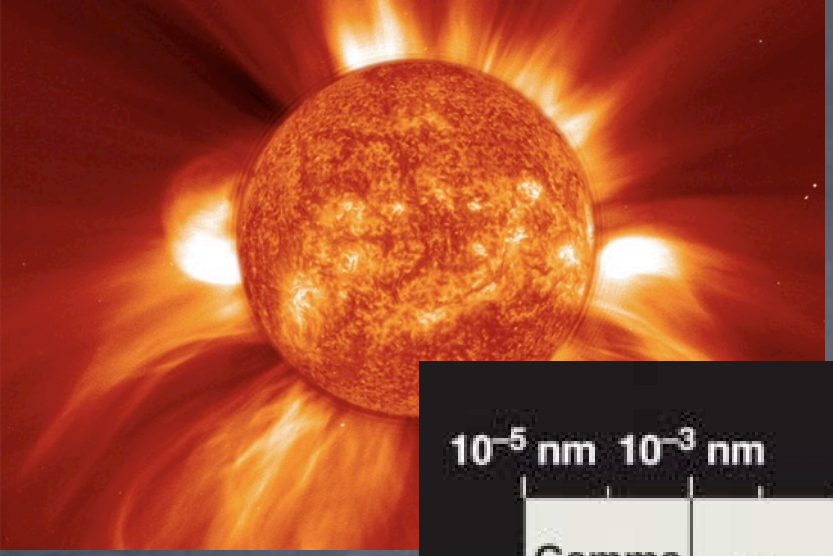
Introduction to Photosynthesis

Chlorophyll a:
the mover and shaker

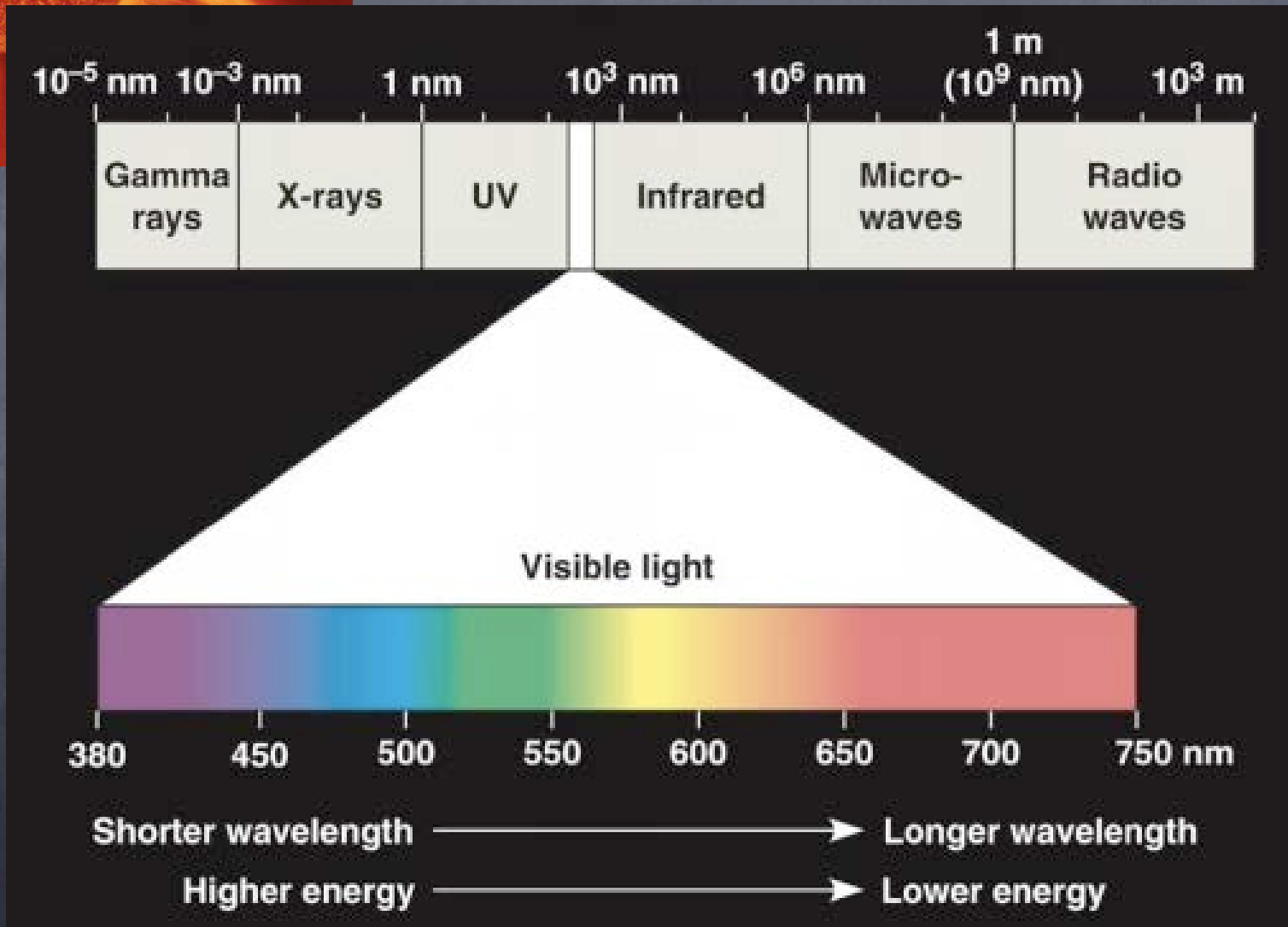


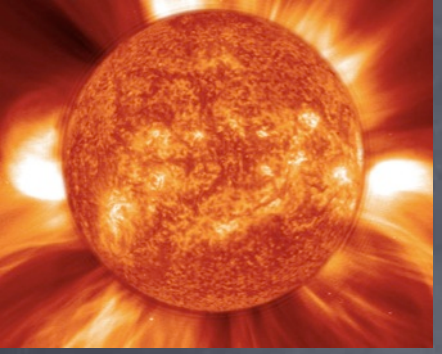
Chlorophyll *a*



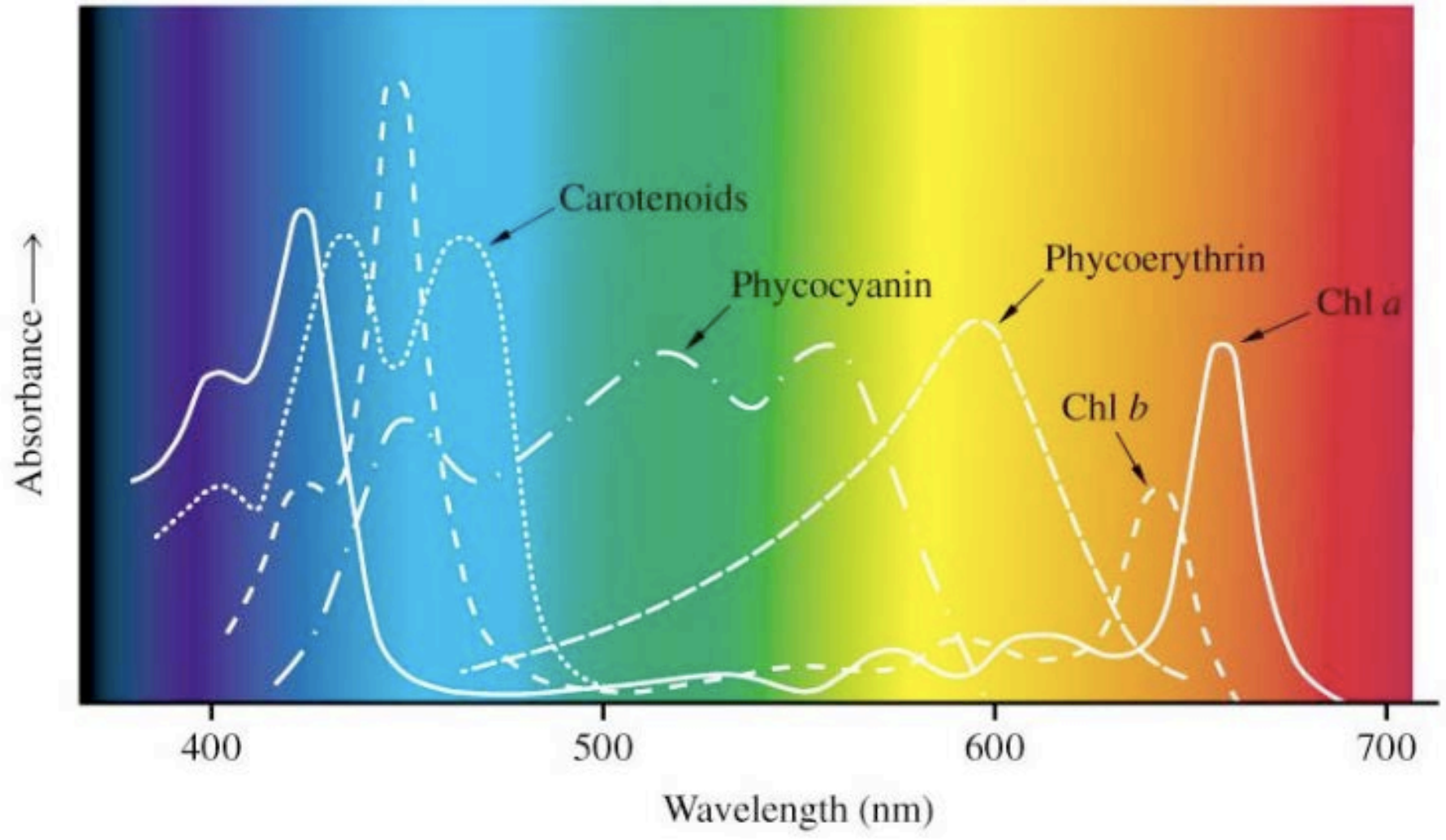


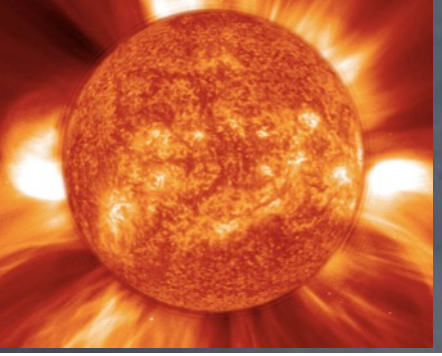
Light Reactions of Photosynthesis



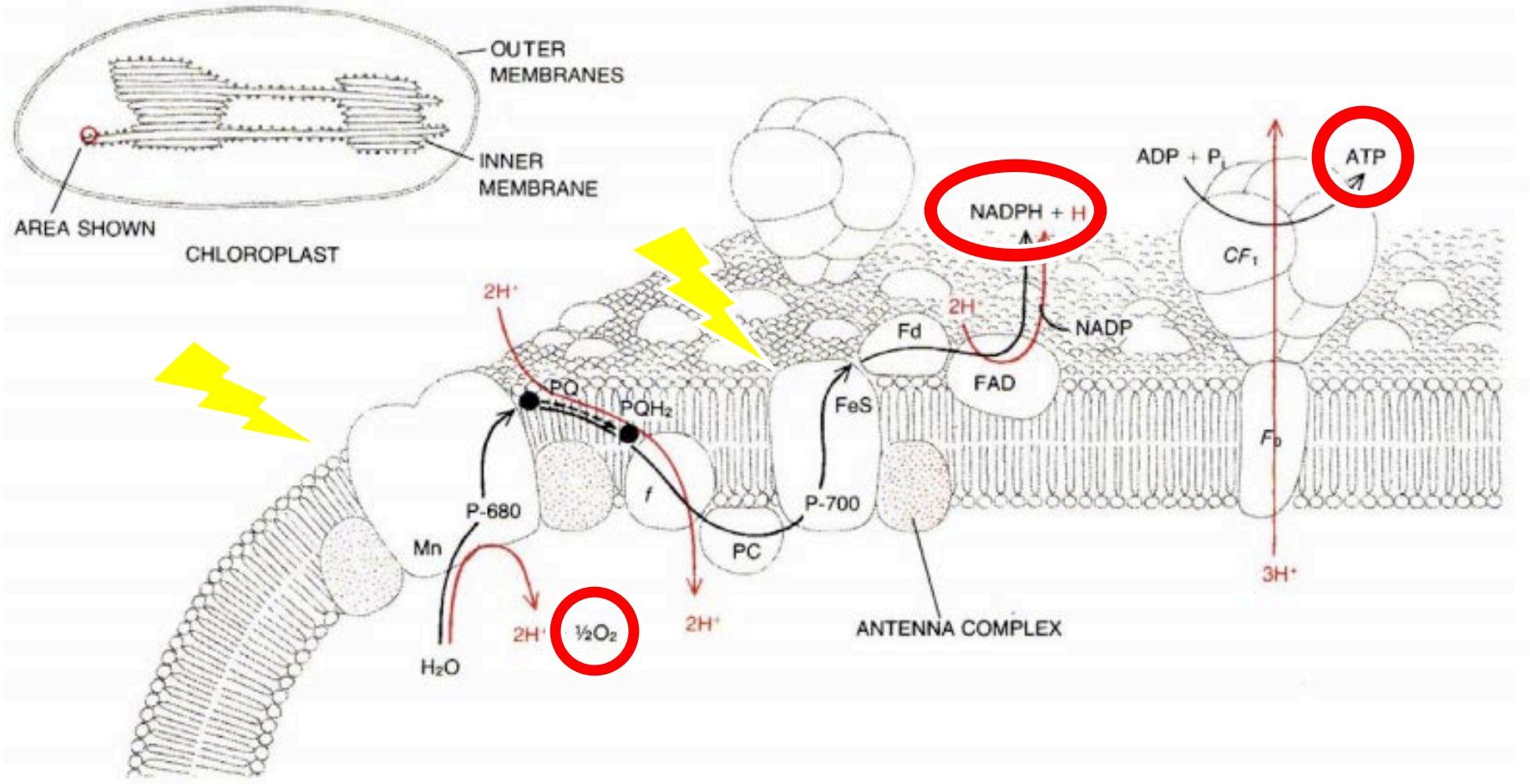


Light Reactions of Photosynthesis

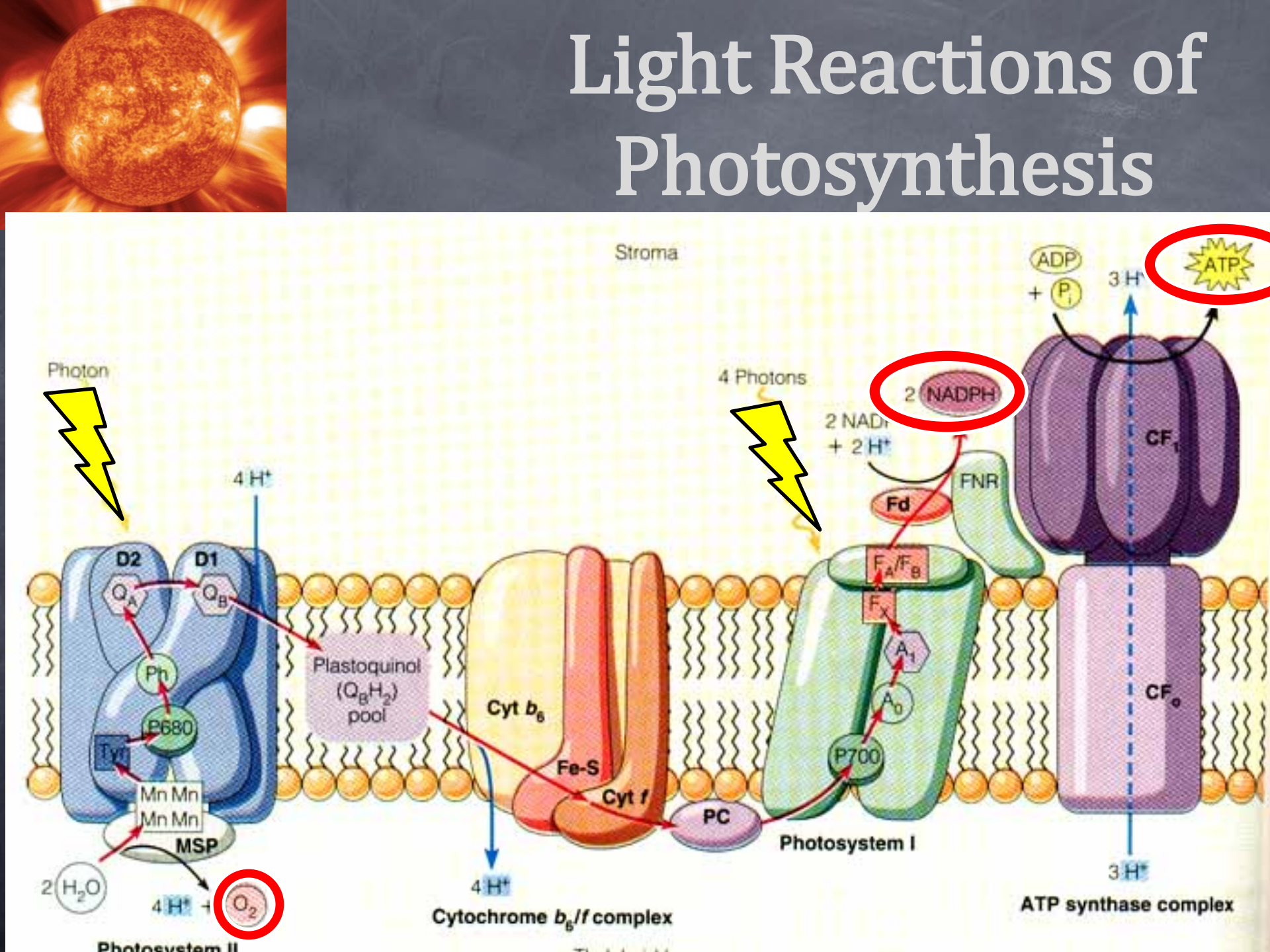


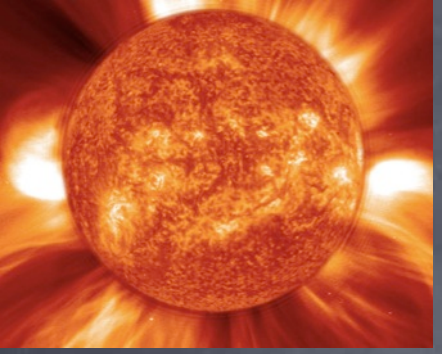


Light Reactions of Photosynthesis

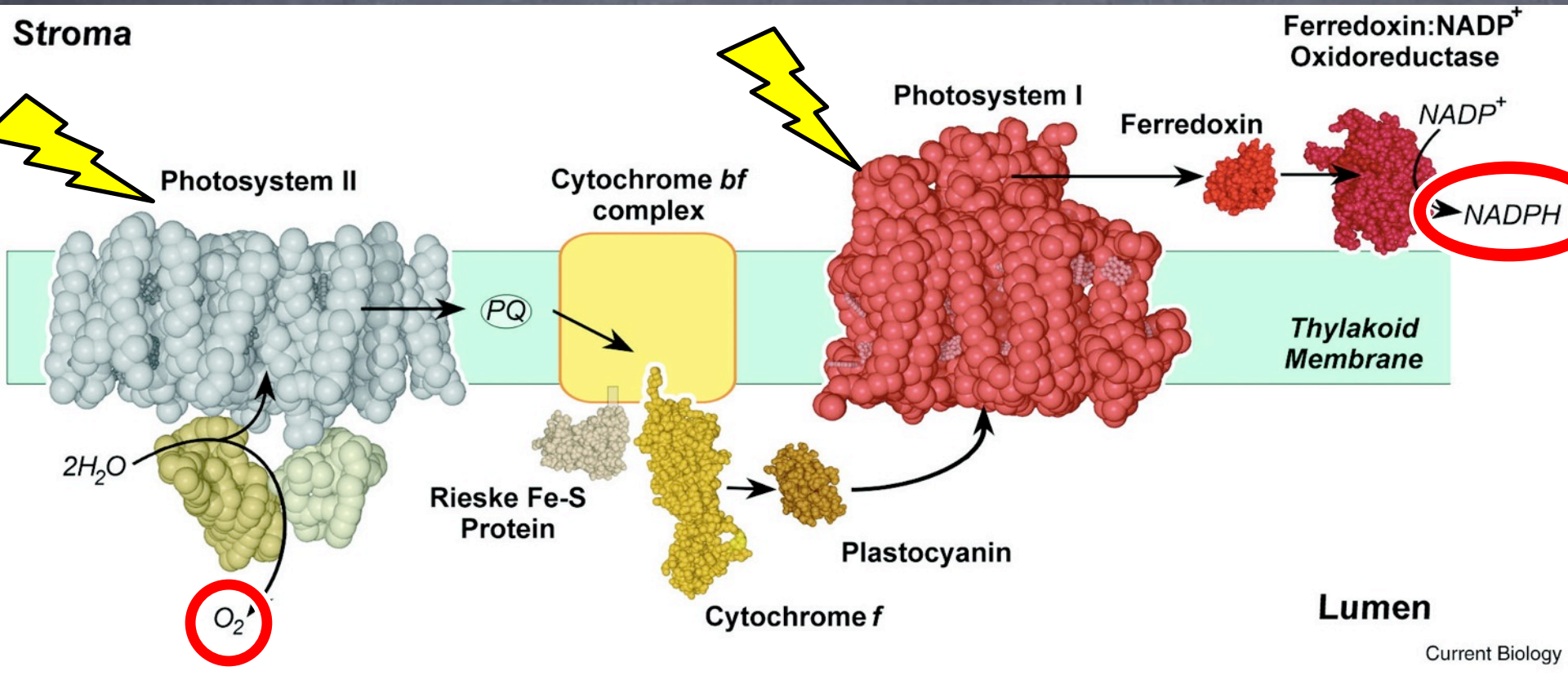


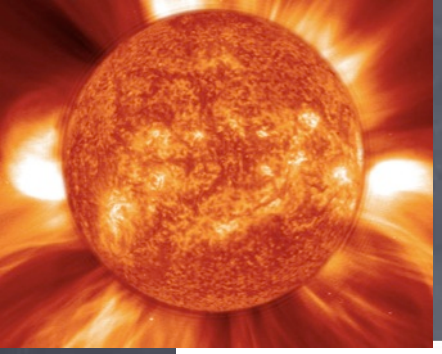
Light Reactions of Photosynthesis



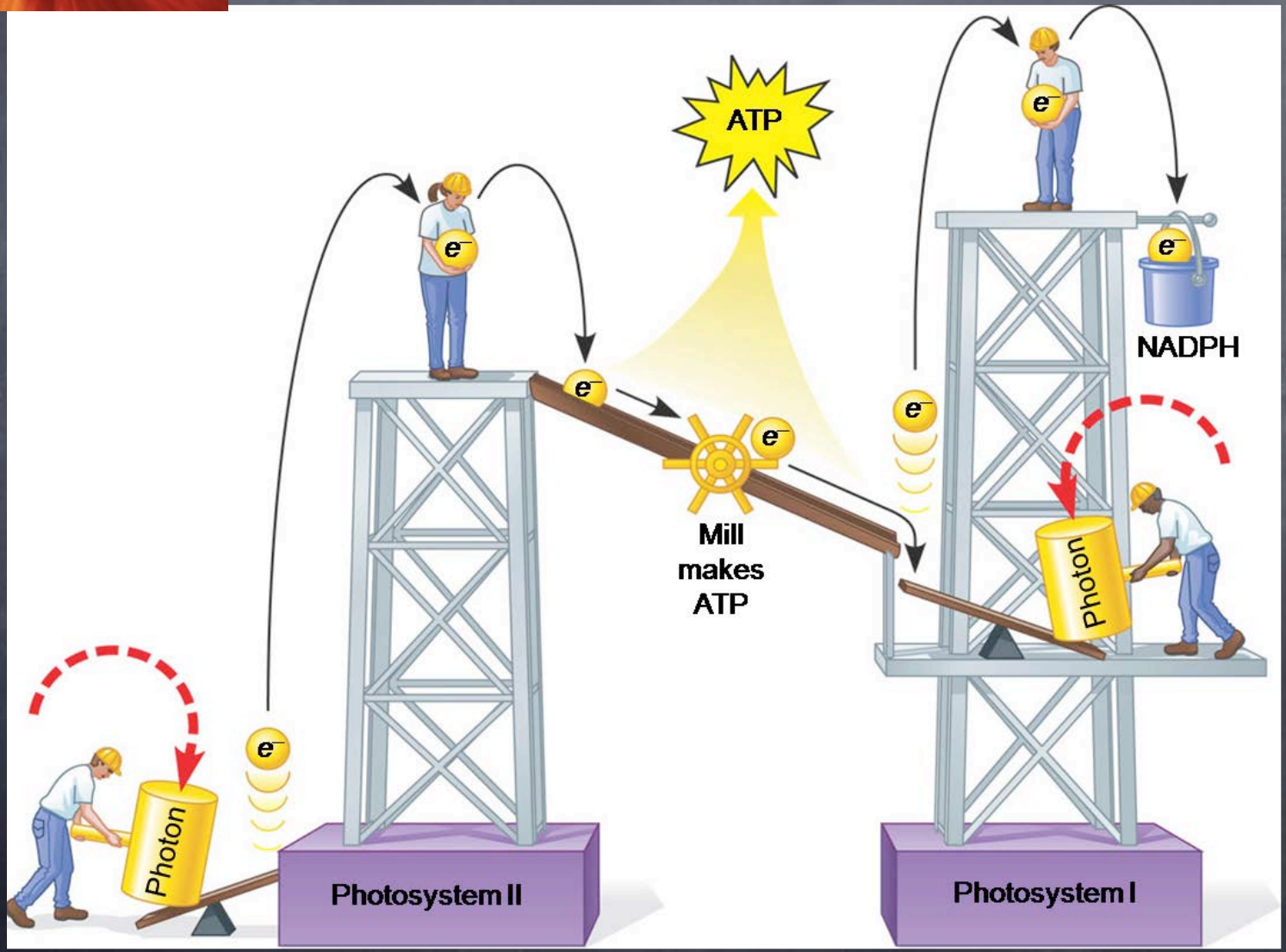


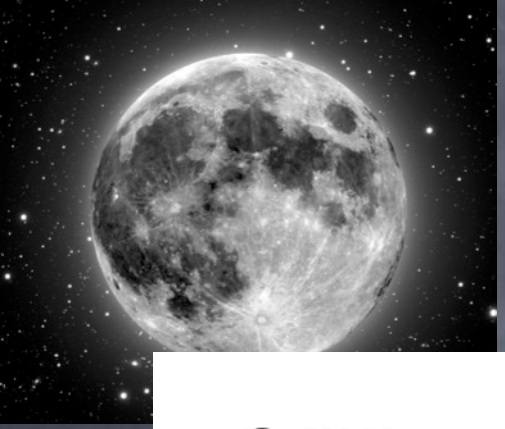
Light Reactions of Photosynthesis





Light Reactions of Photosynthesis





‘Dark’ Reactions of Photosynthesis

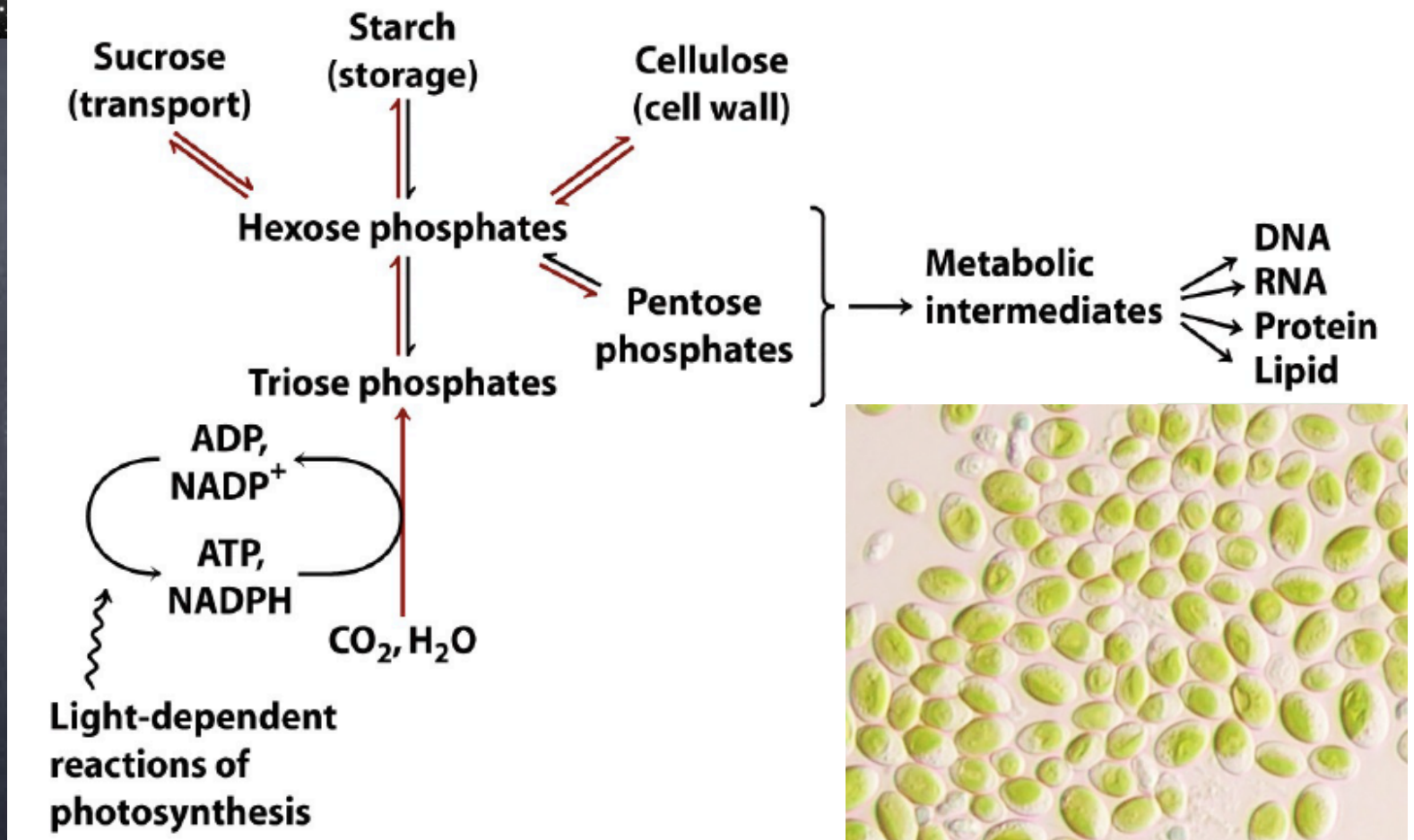


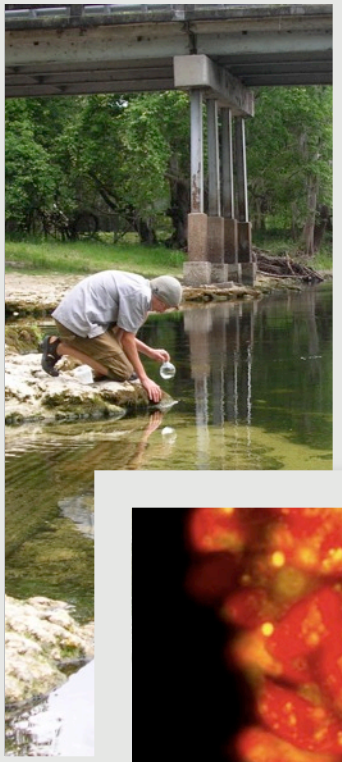
Figure 20-1
Lehninger Principles of Biochemistry, Fifth Edition

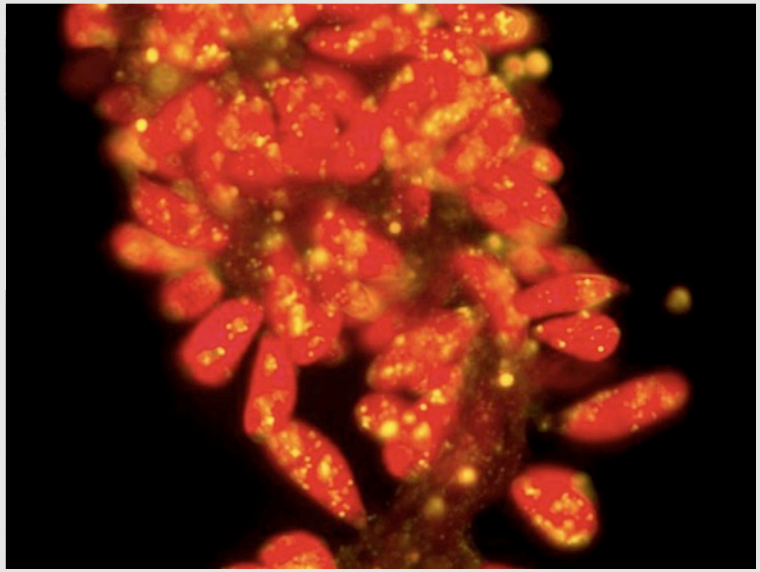
BEST Lab Foci

- Phyco-prospecting
- Algal biofuel production
  - Biodiesel
  - Biogas
- Landfill leachate remediation

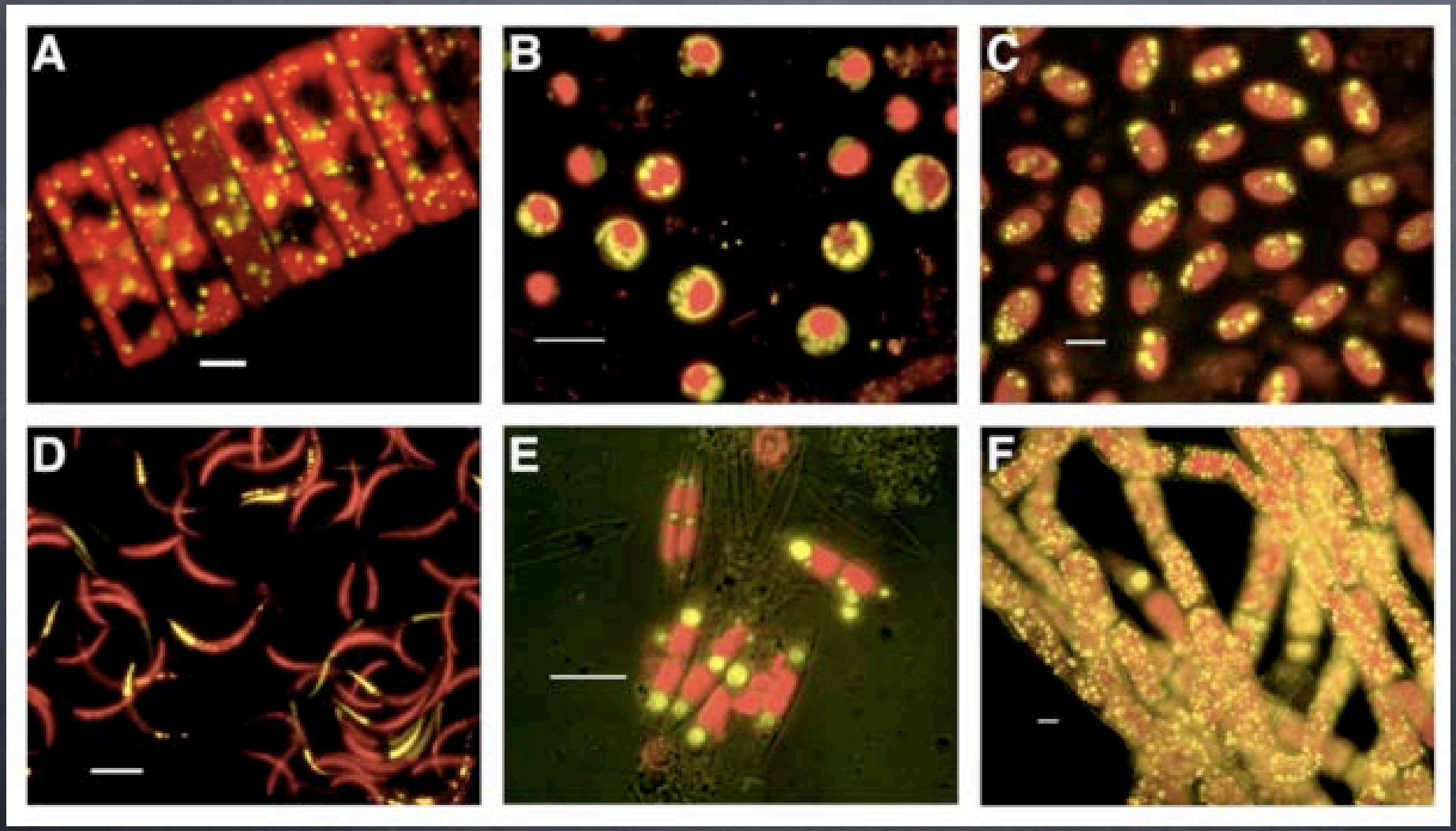
Phycoprospecting

- Find a biological base
- Utilizing the fluorochrome Nile Red for cellular lipid staining
- Local algae are collected and evaluated for the metabolic capacity to store photosynthetic energy in the form of energy-dense neutral lipids (oils)





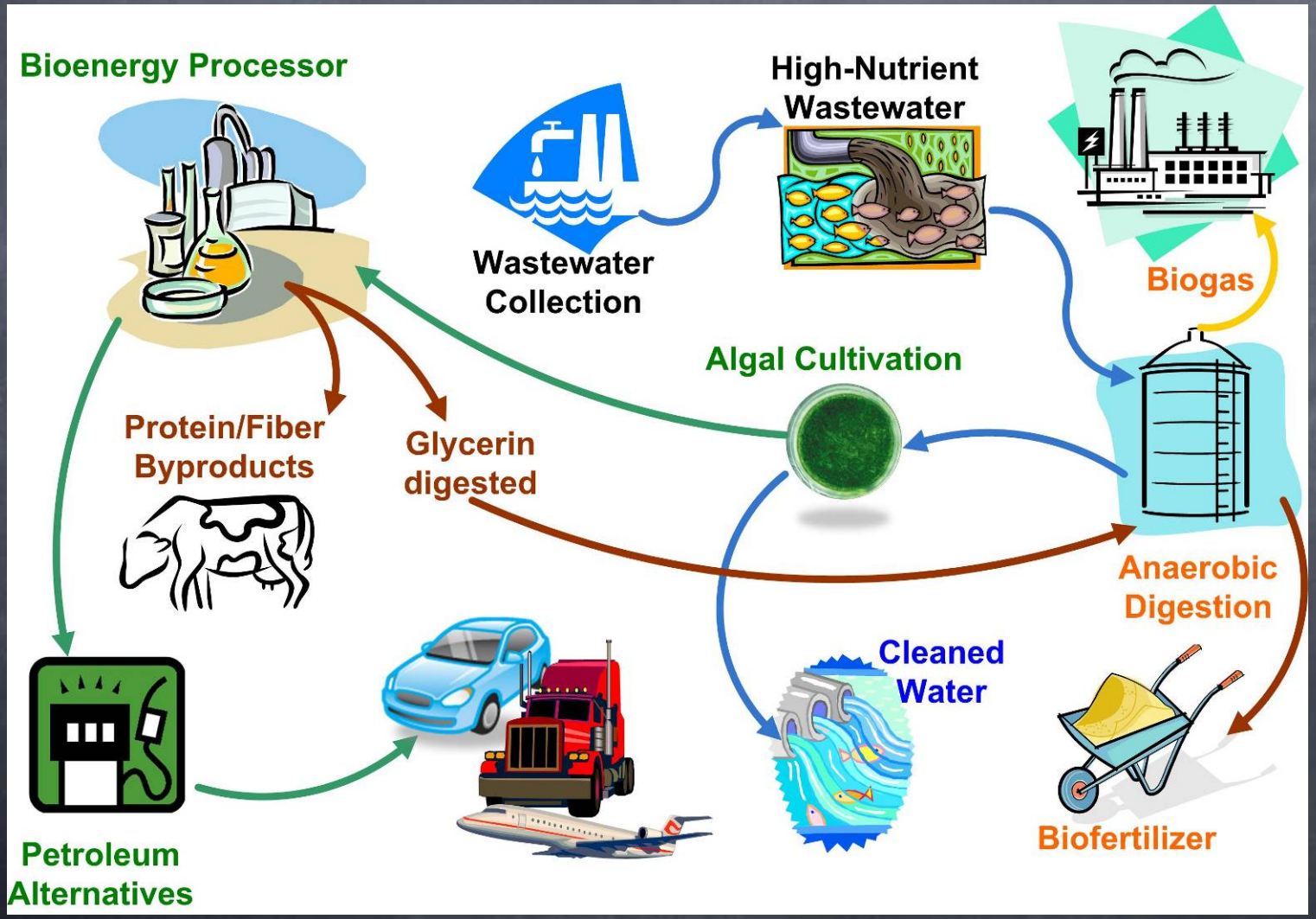
PhycoProspects



Why Algae?

- Remediate Waste
  - Municipal sewage, agricultural wastes, landfill leachates, industrial wastes.
- Biological Diversity
  - Immense natural genetic diversity can grow on fresh, brackish, or saline waters.
  - Produce a variety of secondary metabolites (oil!)
- Efficient Photosynthesizers!
  - Can be grown anywhere light, moisture, and nutrients converge
- Abundant growth
  - Algae form the trophic basis for many aquatic and terrestrial ecosystems

Algae and the Human Ecosystem




Chlorella sp. UF (high lipid strain)
Questions? Comments?
125x