

Biology

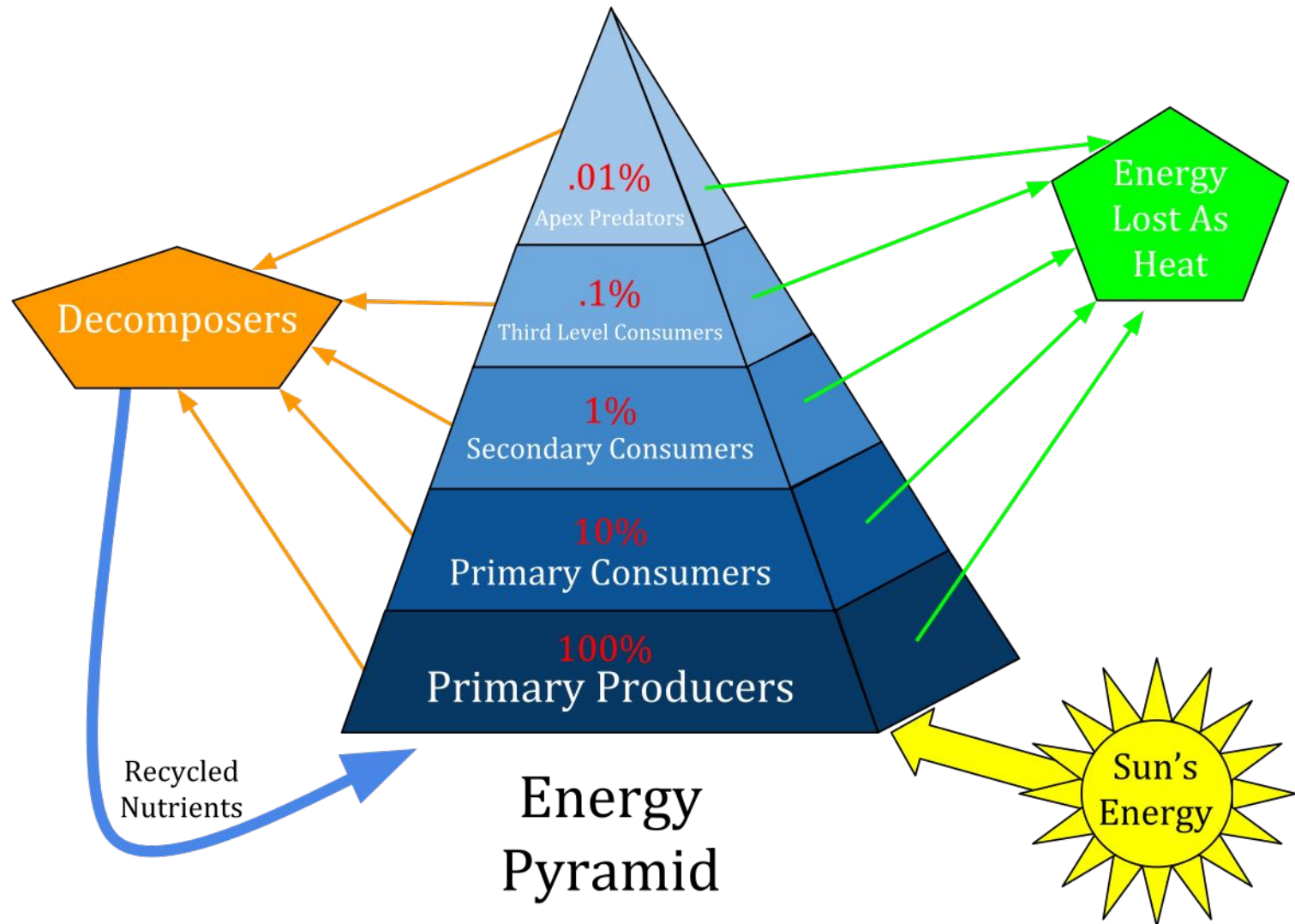
ES131

Module 2

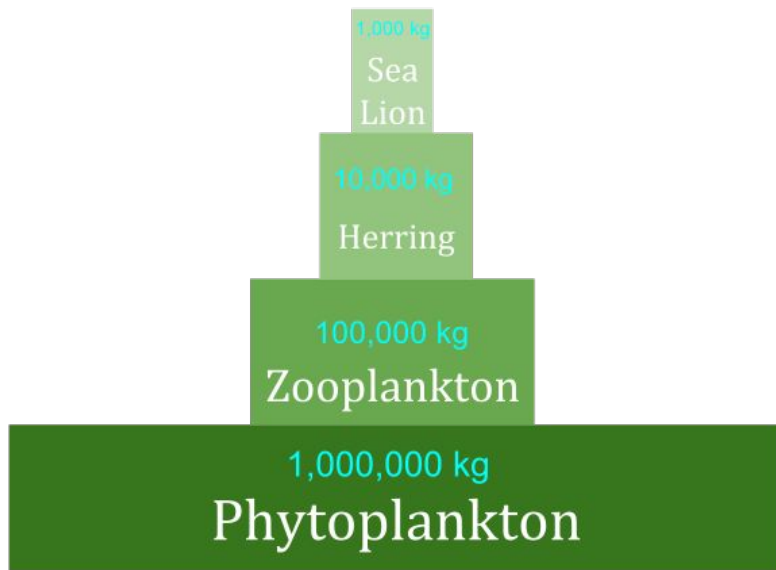
Physics in Biology (Part 2)

Energy Pyramid, Structural Colors, Water Transport

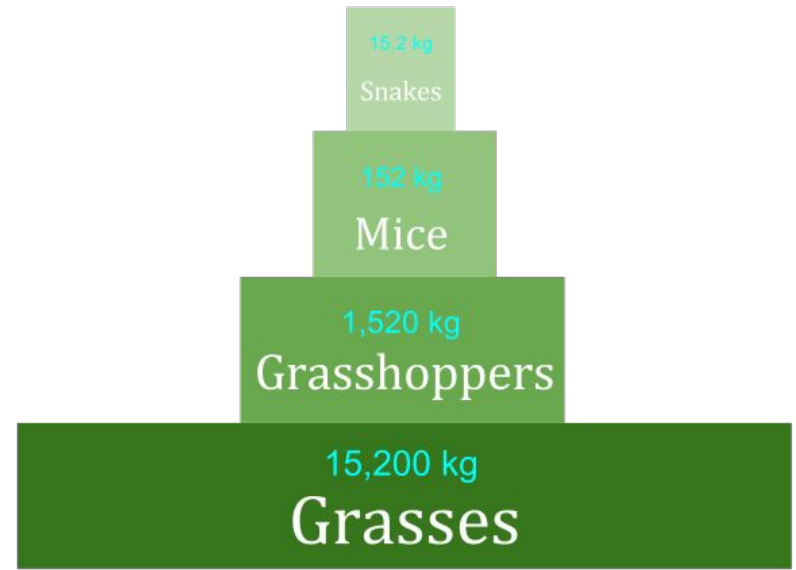
Energy Pyramid



Biomass Pyramid

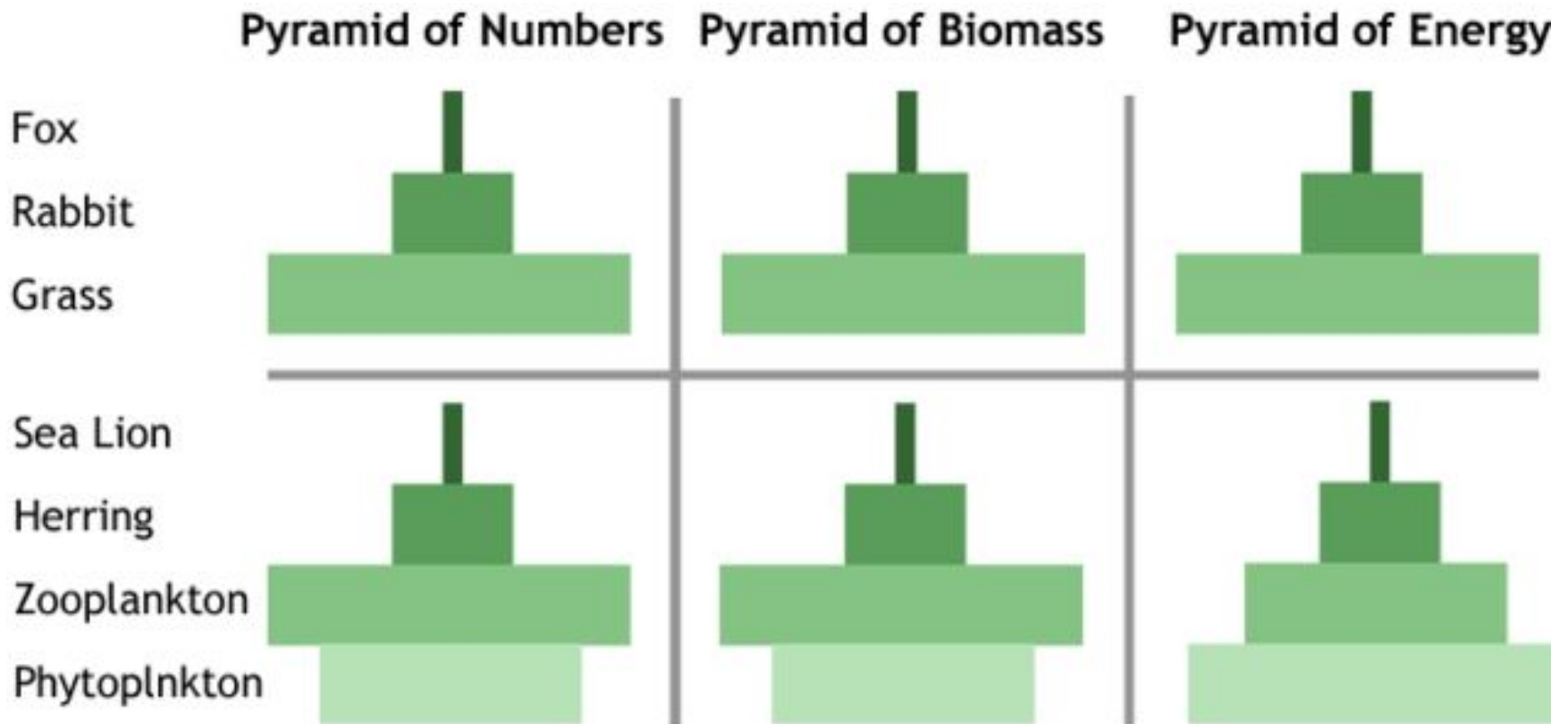


Aquatic
Ecosystem



Terrestrial
Ecosystem

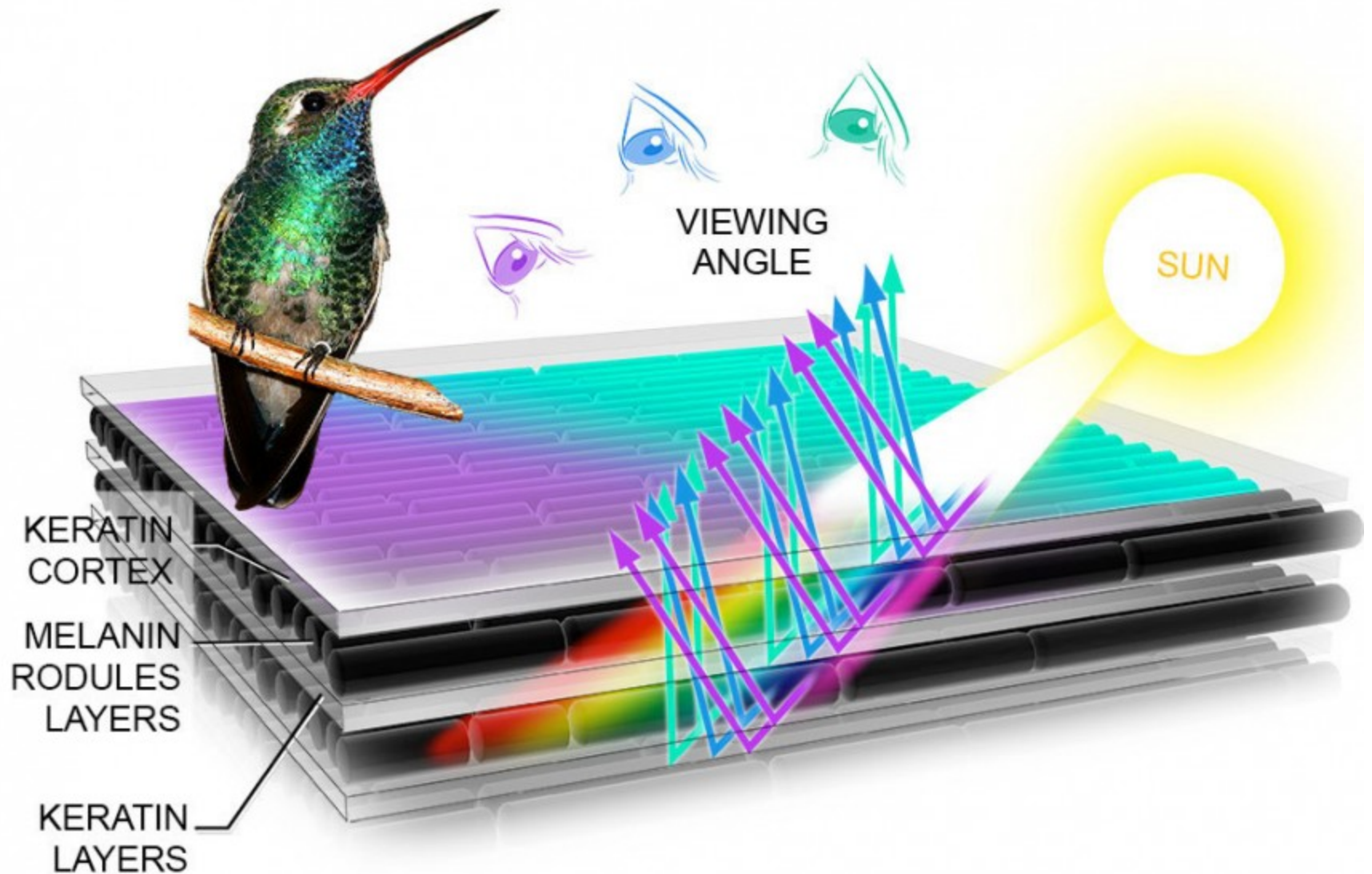
Biomass-Energy Pyramid

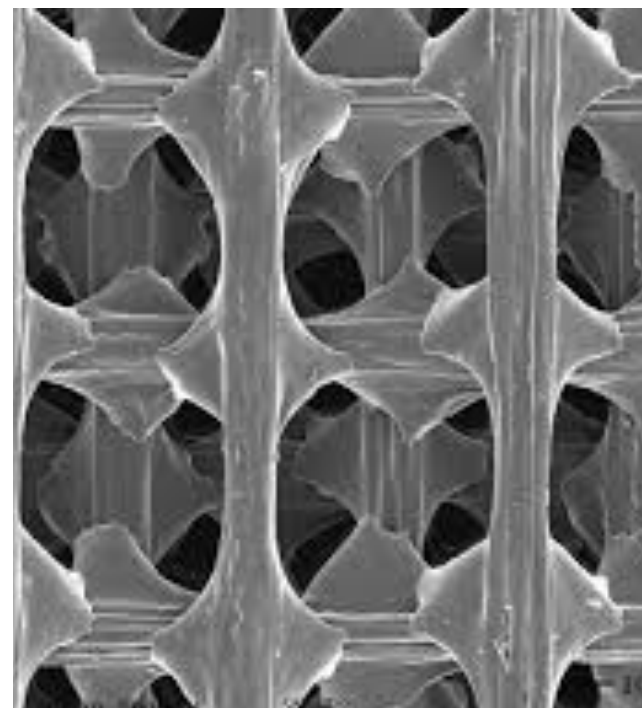
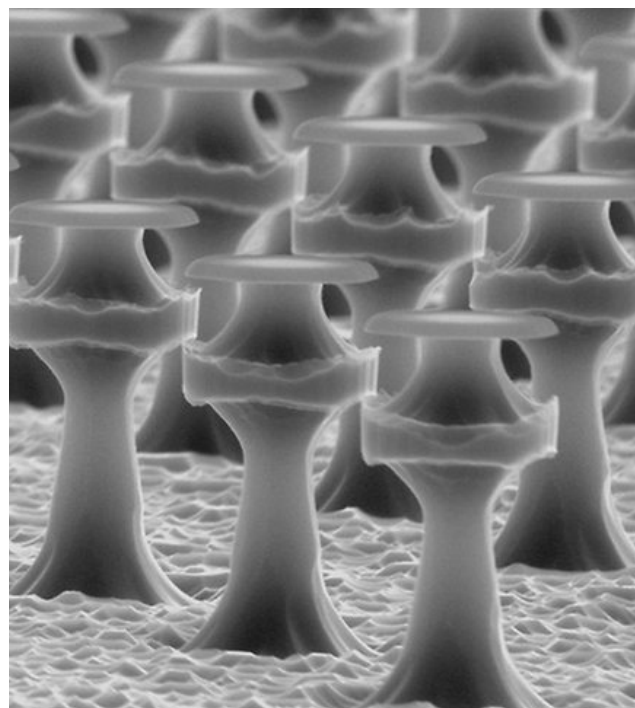
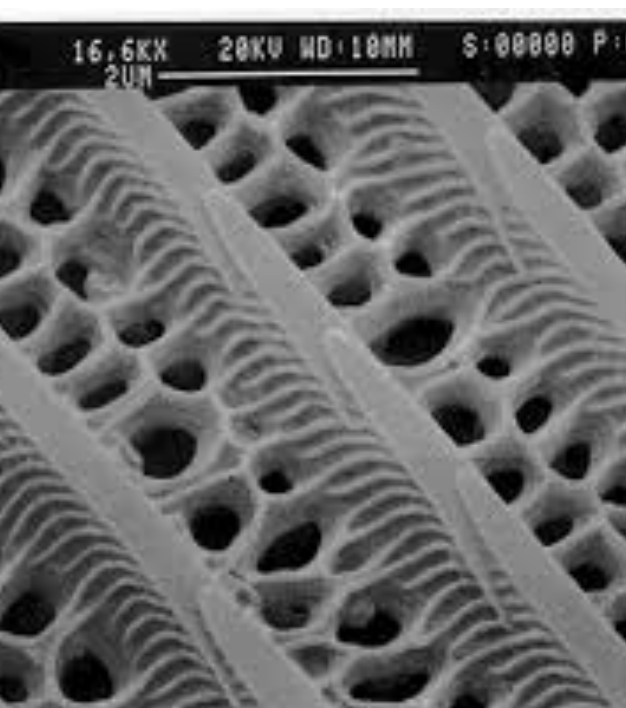
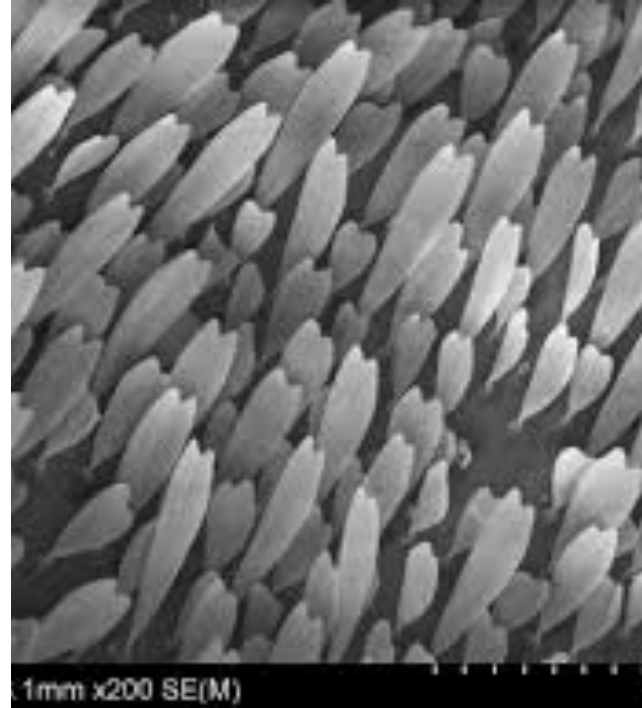
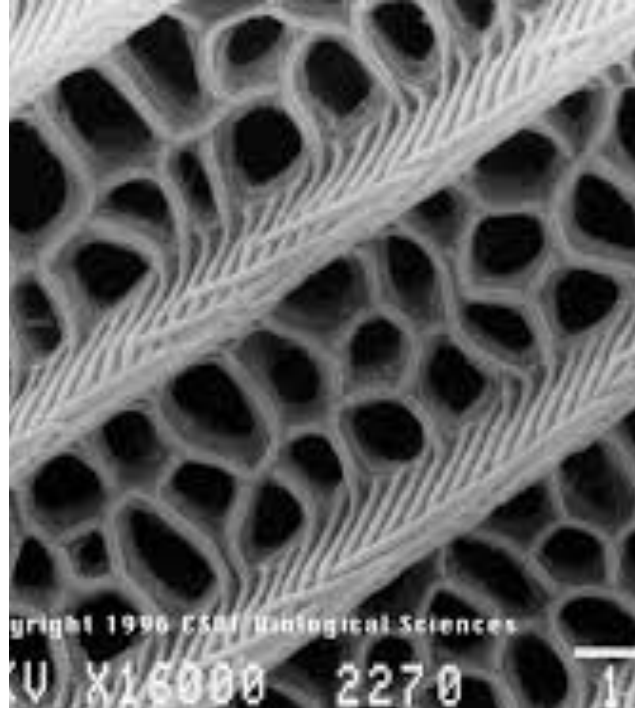
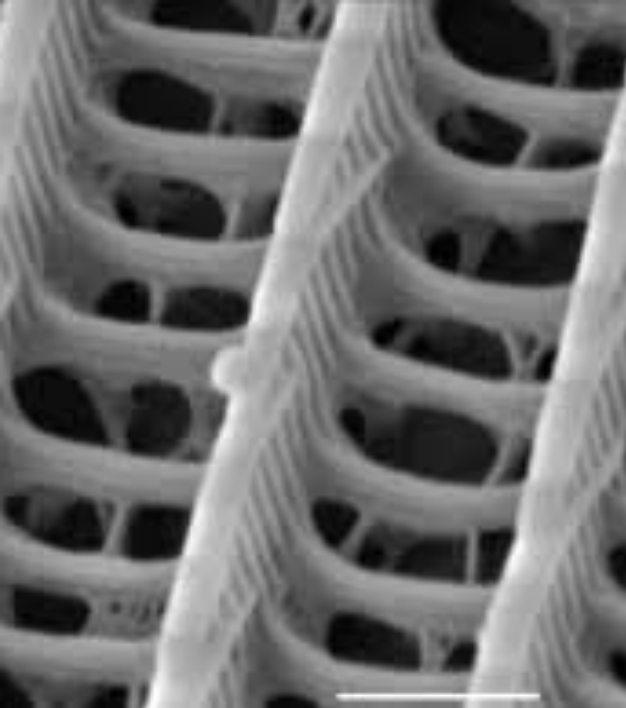


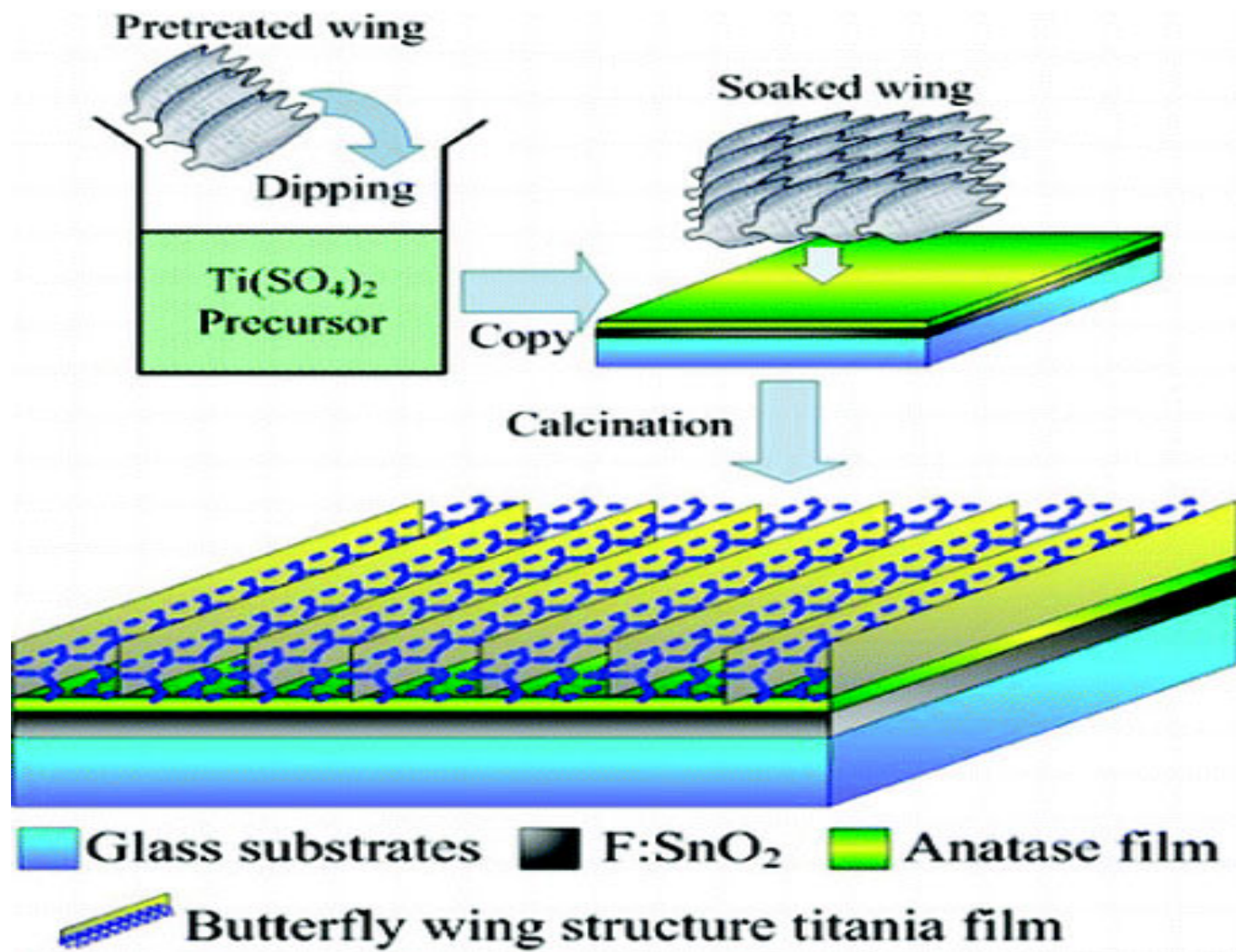
Structural Colors



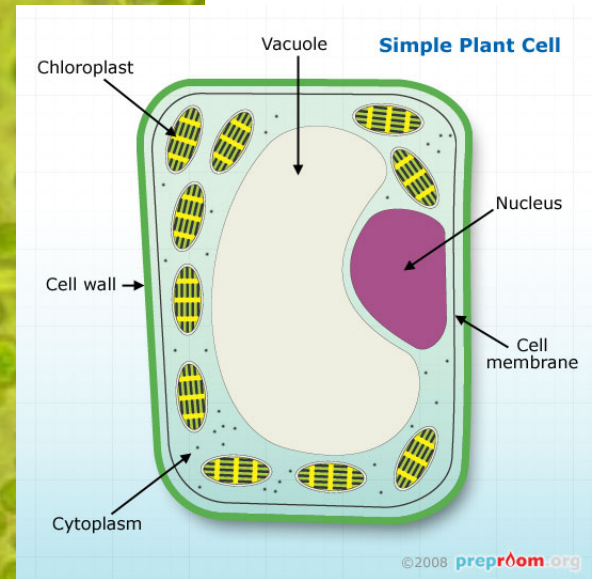
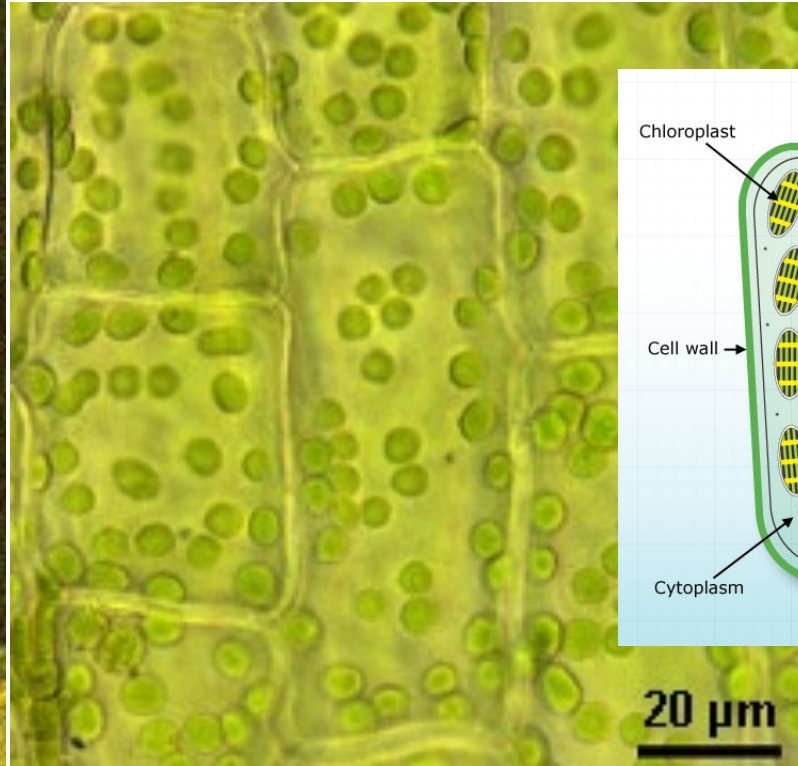
Diffraction Grating



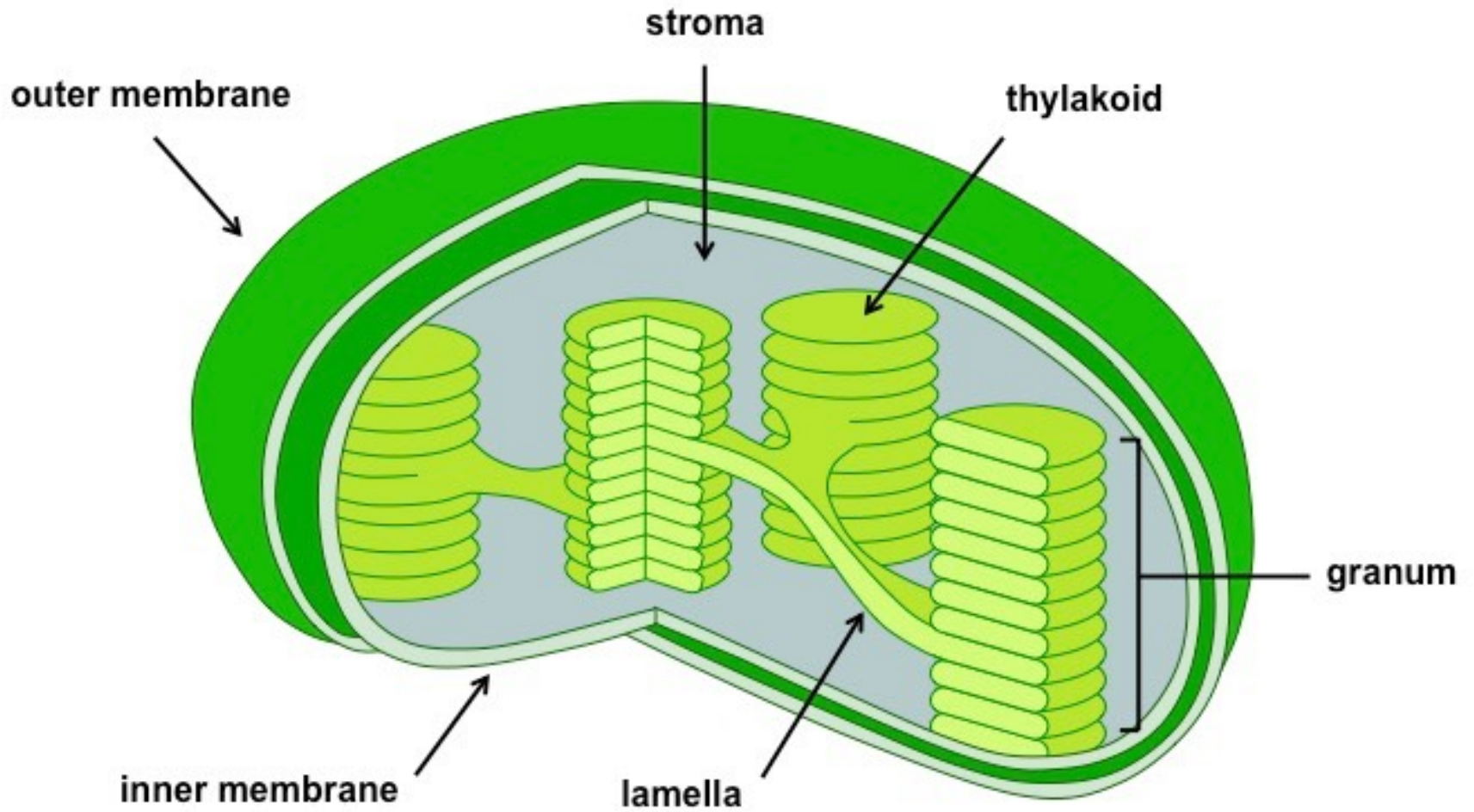


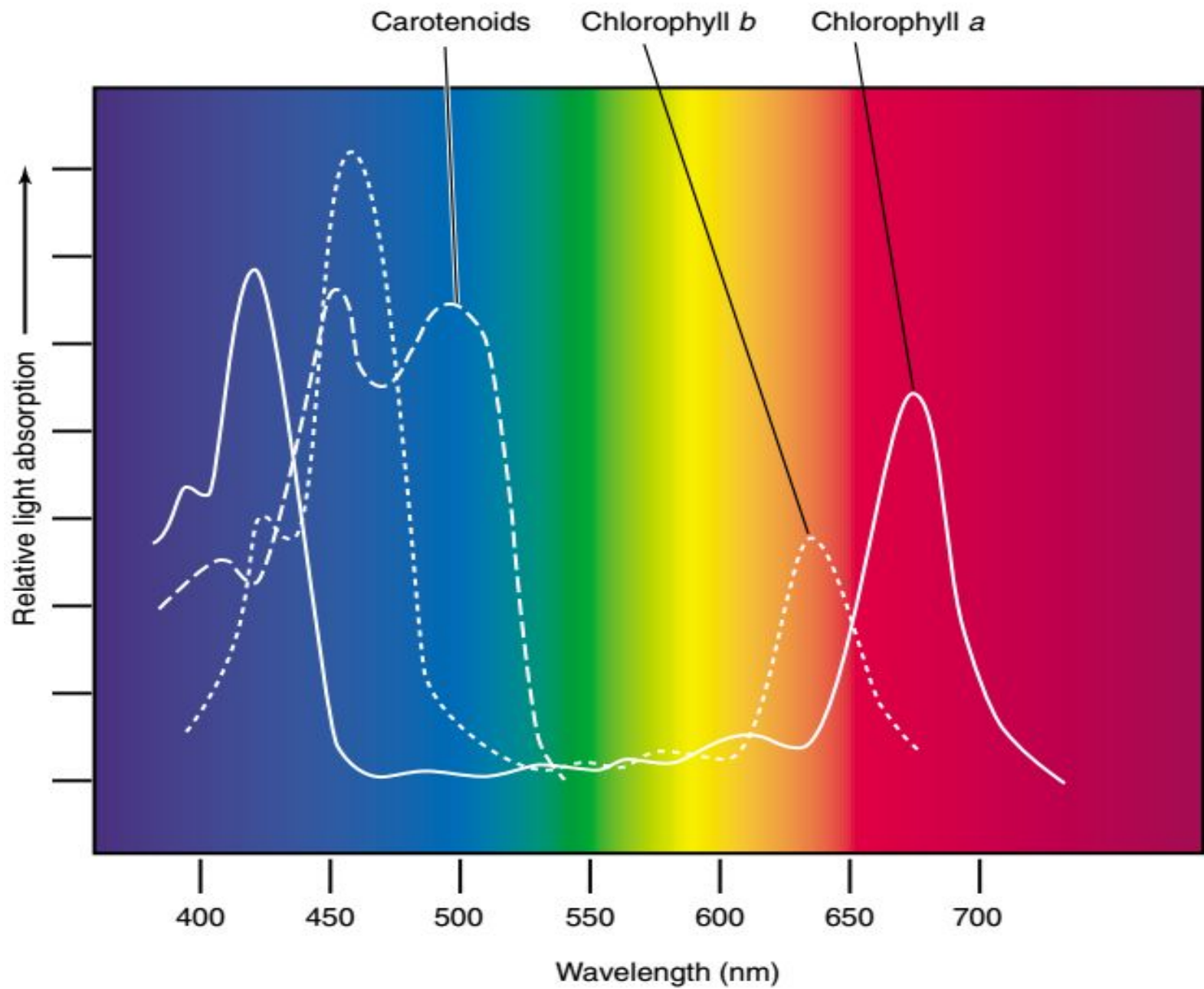


Why are Plants Green?



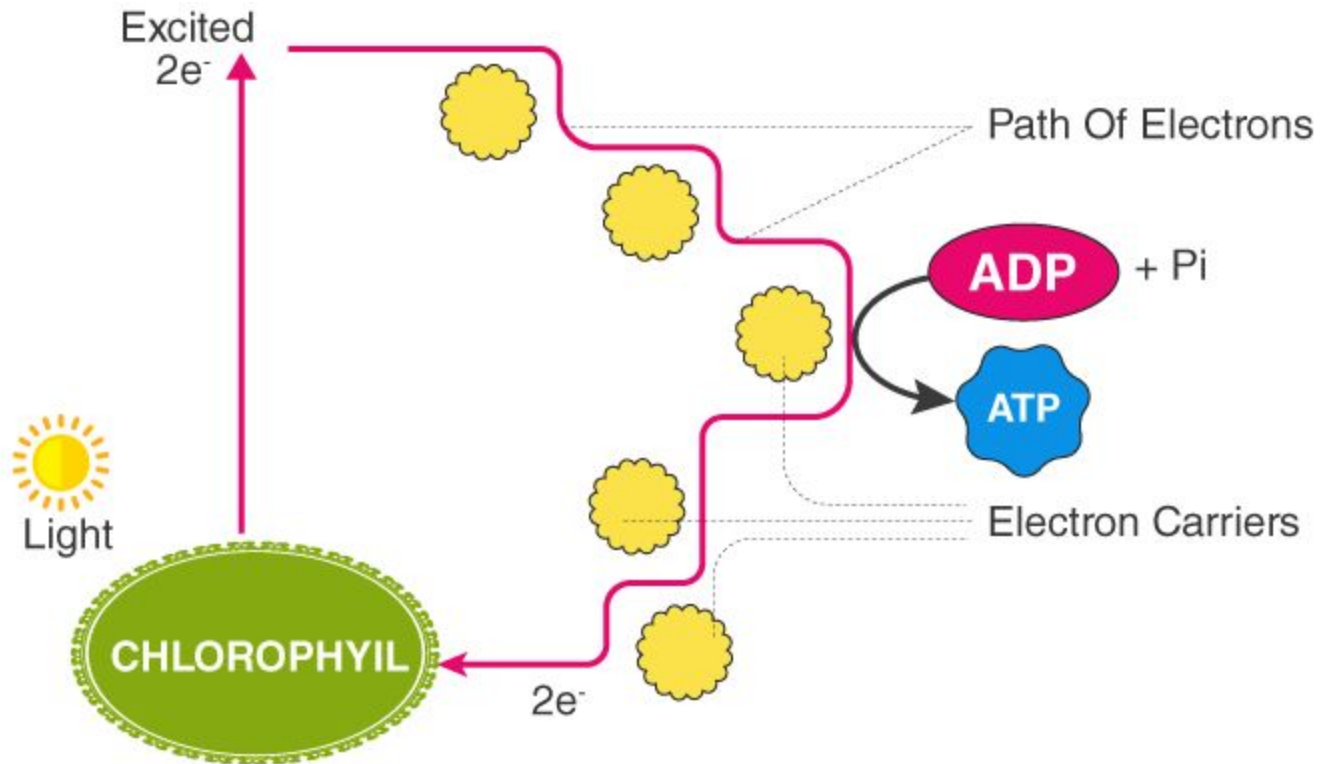
Chloroplasts



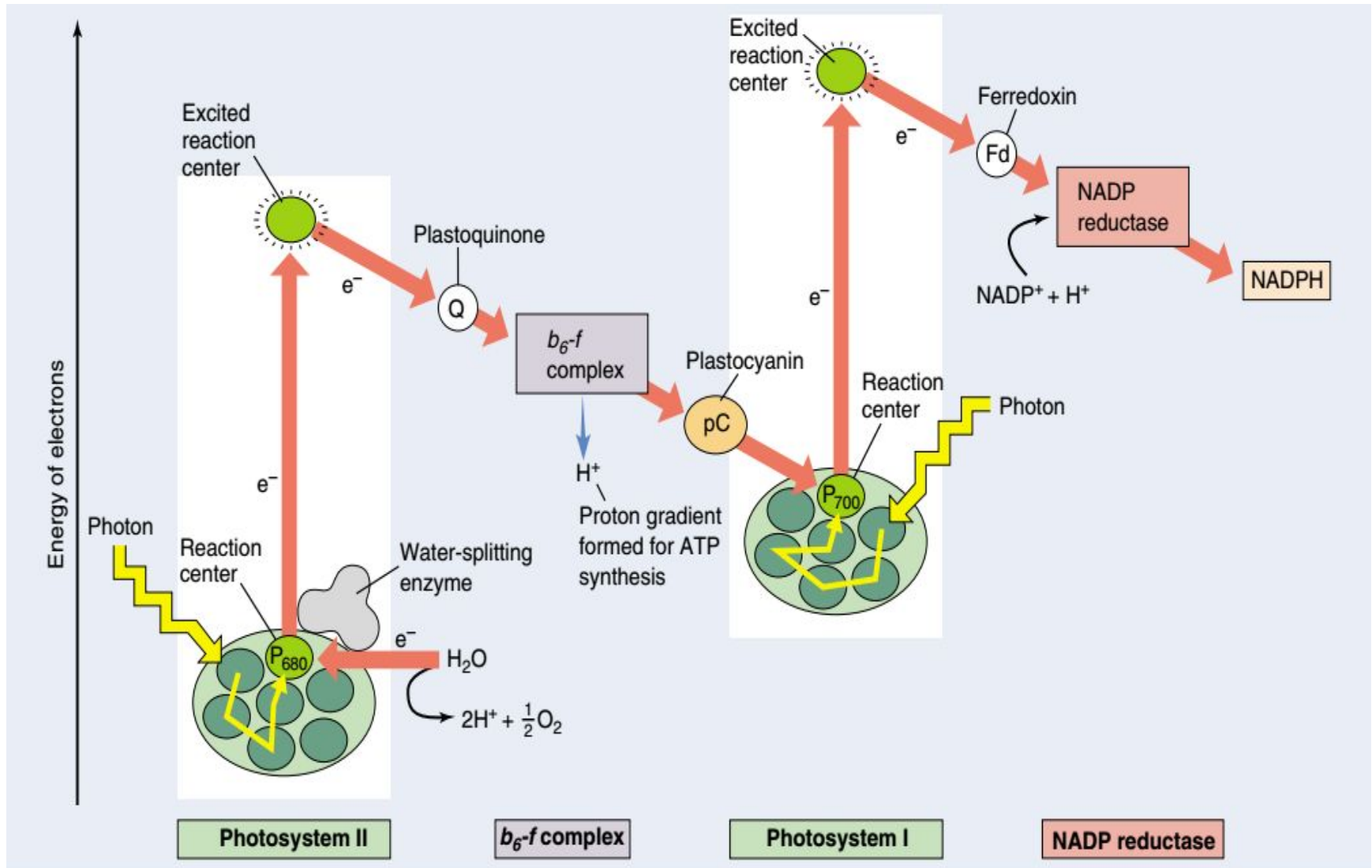


Cyclic Photophosphorylation

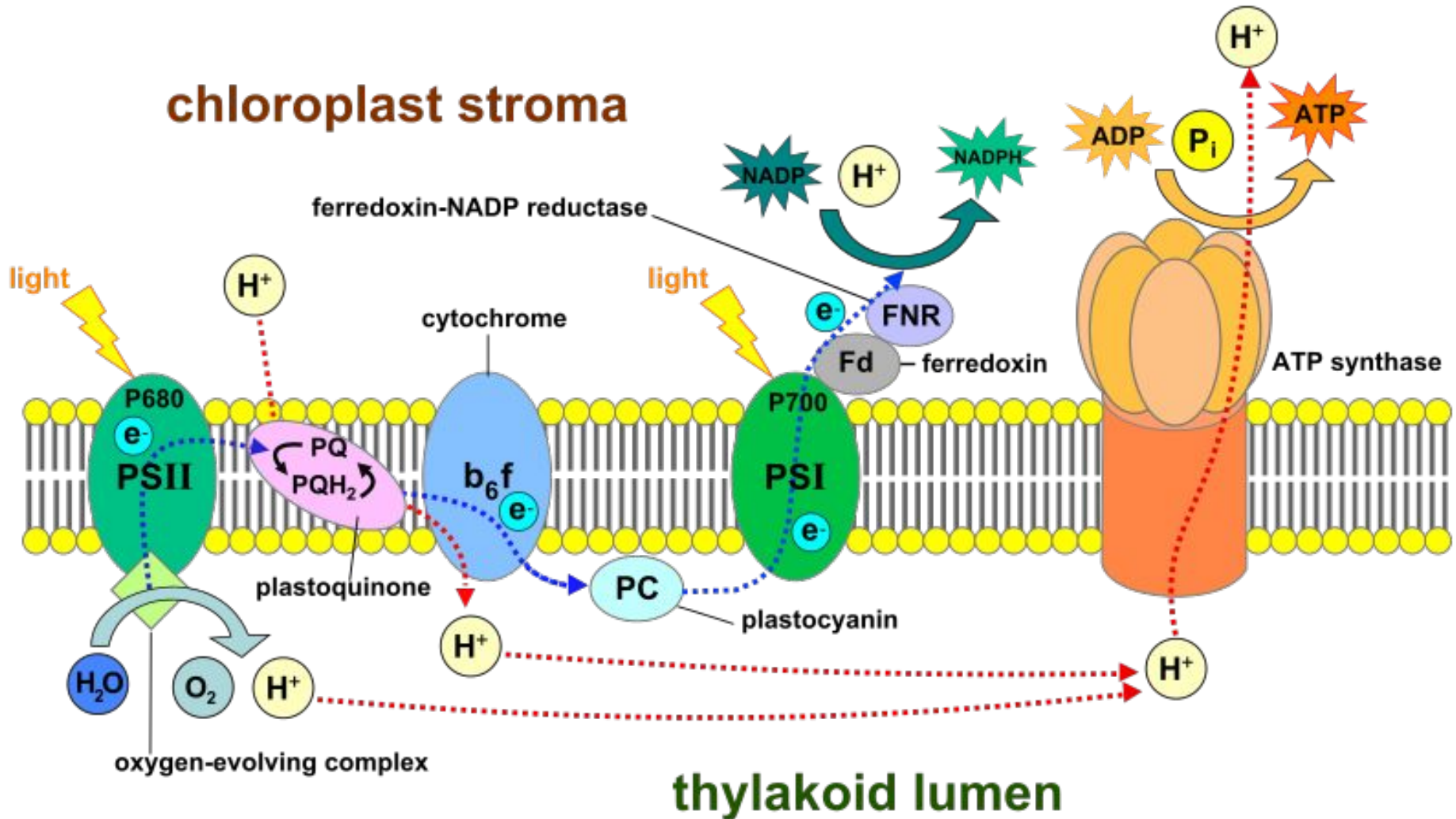
- Process for ATP generation associated with some Photosynthetic Bacteria
- Reaction Center \Rightarrow 700 nm



Non-cyclic Photophosphorylation



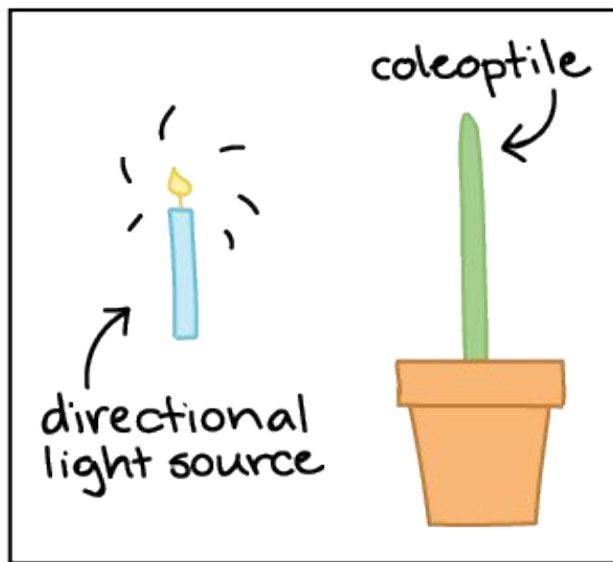
Non-cyclic Photophosphorylation



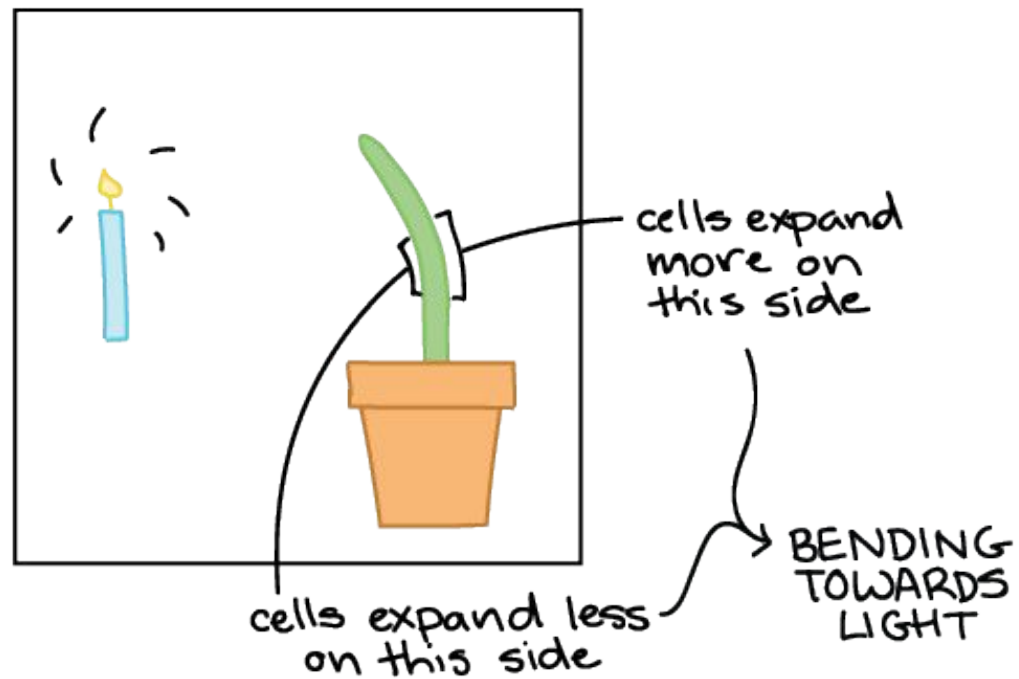
Engineering Connection

1. Engineers are faced with the challenge of designing energy efficient systems for heating buildings, for example, or creating fuel-efficient vehicles.
2. The photosynthetic process serves as an excellent model for highly efficient engineering design.
3. Plants convert readily available resources (water, sunlight and carbon dioxide) into plant fuel (glucose).
4. The only byproduct of the process is oxygen, which is an environmentally friendly product that is consumable by other organisms.

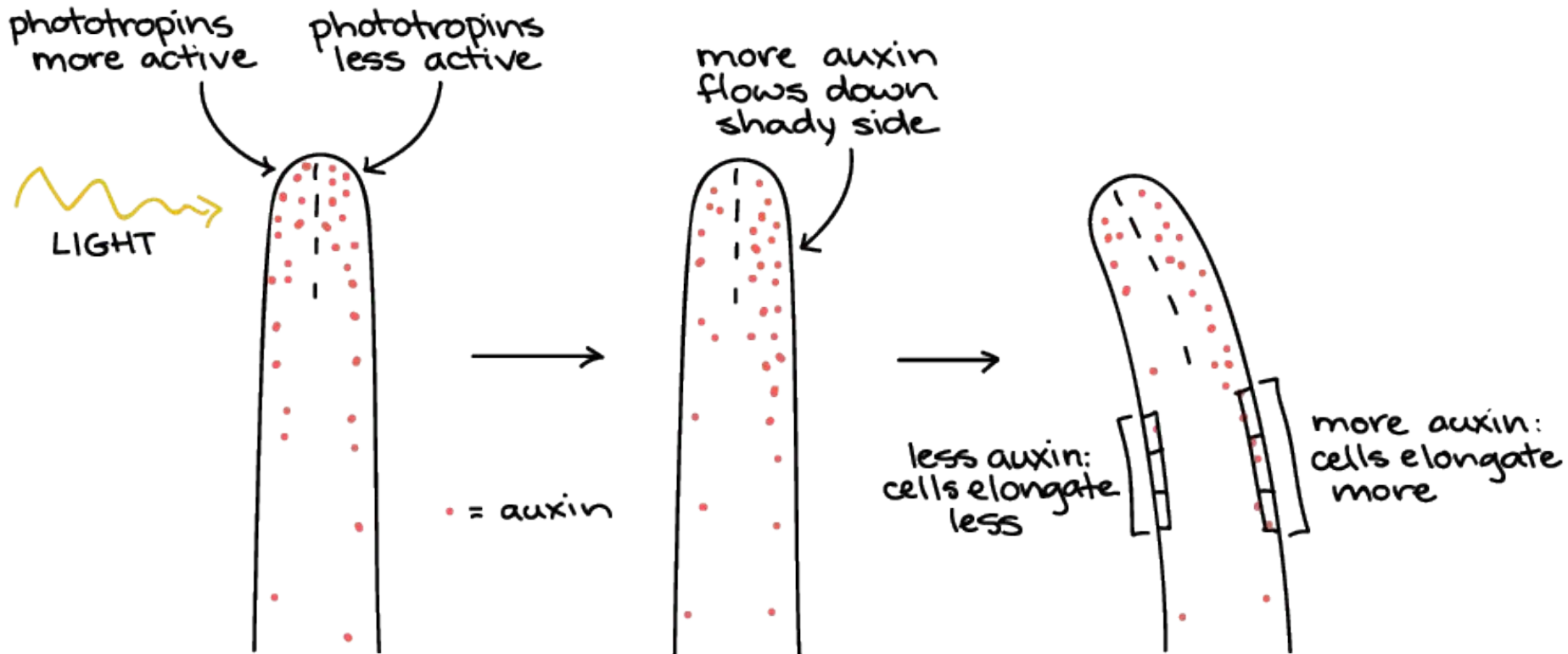
Phototaxis



time
passes
→

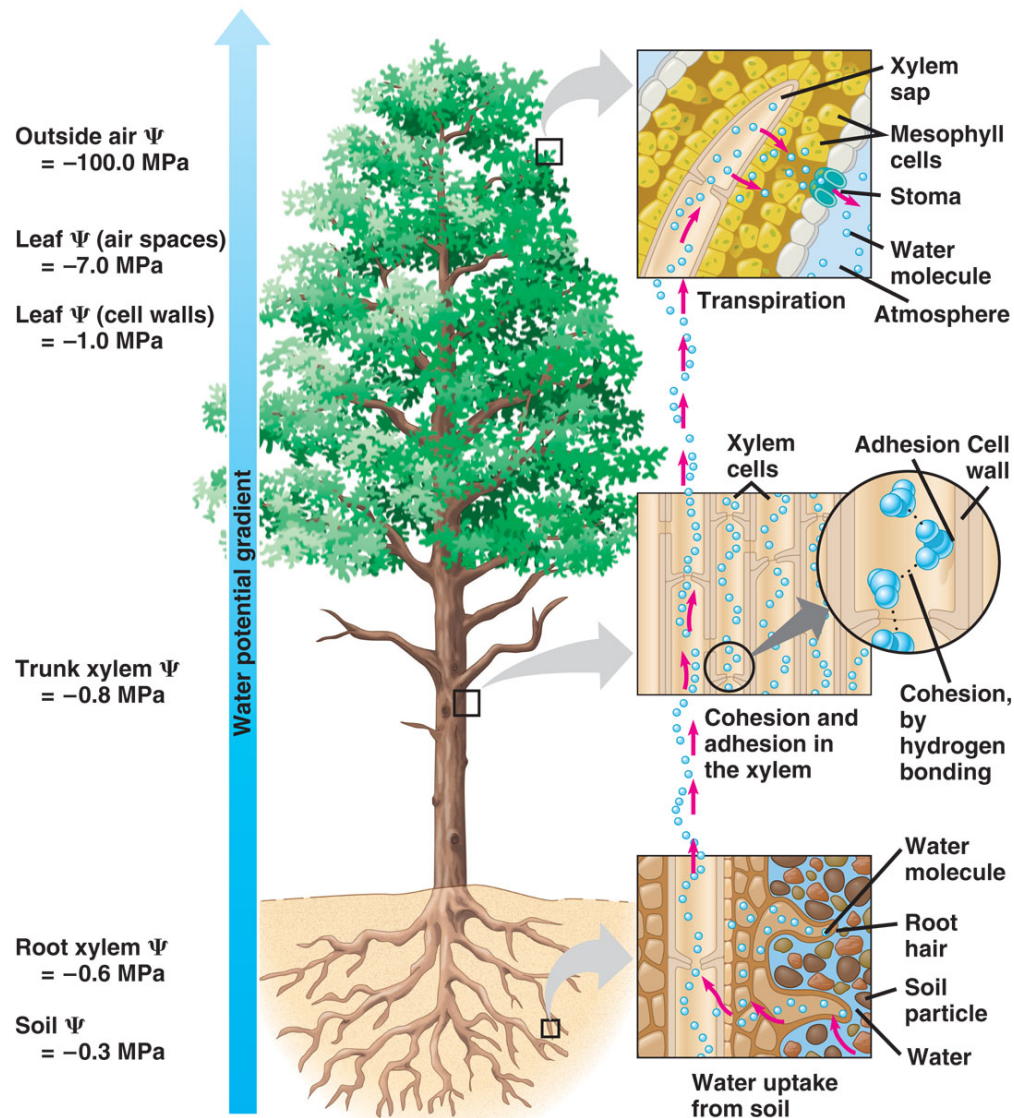


Phototaxis

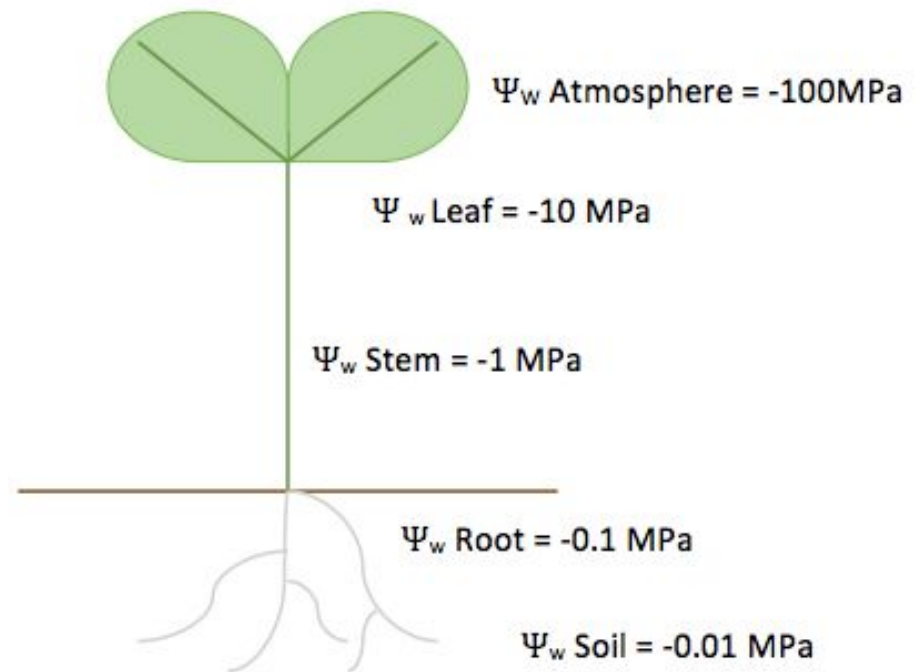
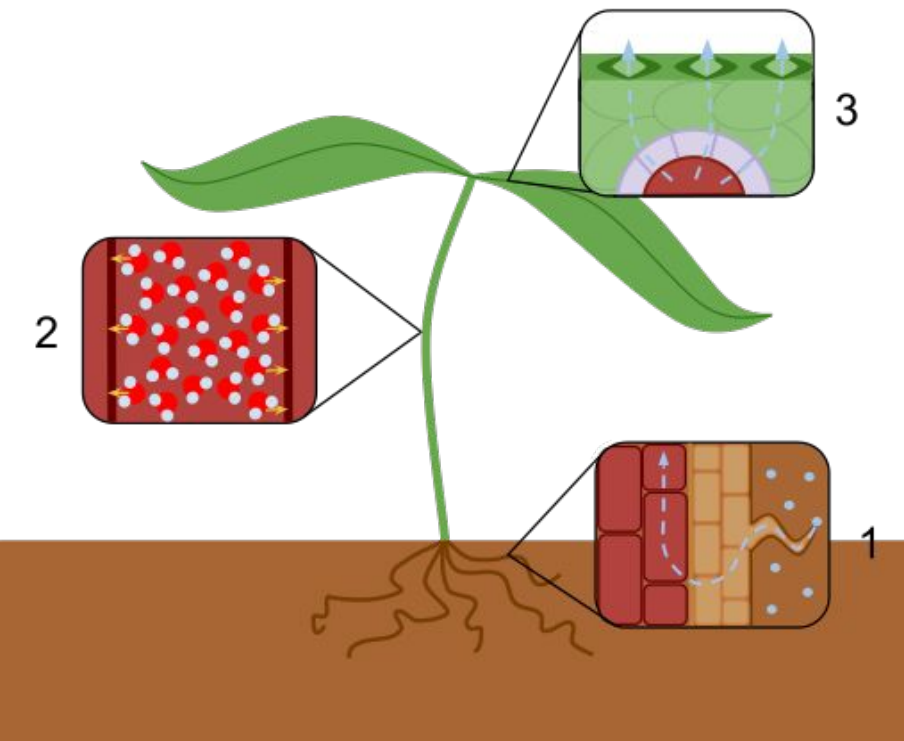


Auxin: Plant growth hormone

Transport of Water in a Tree

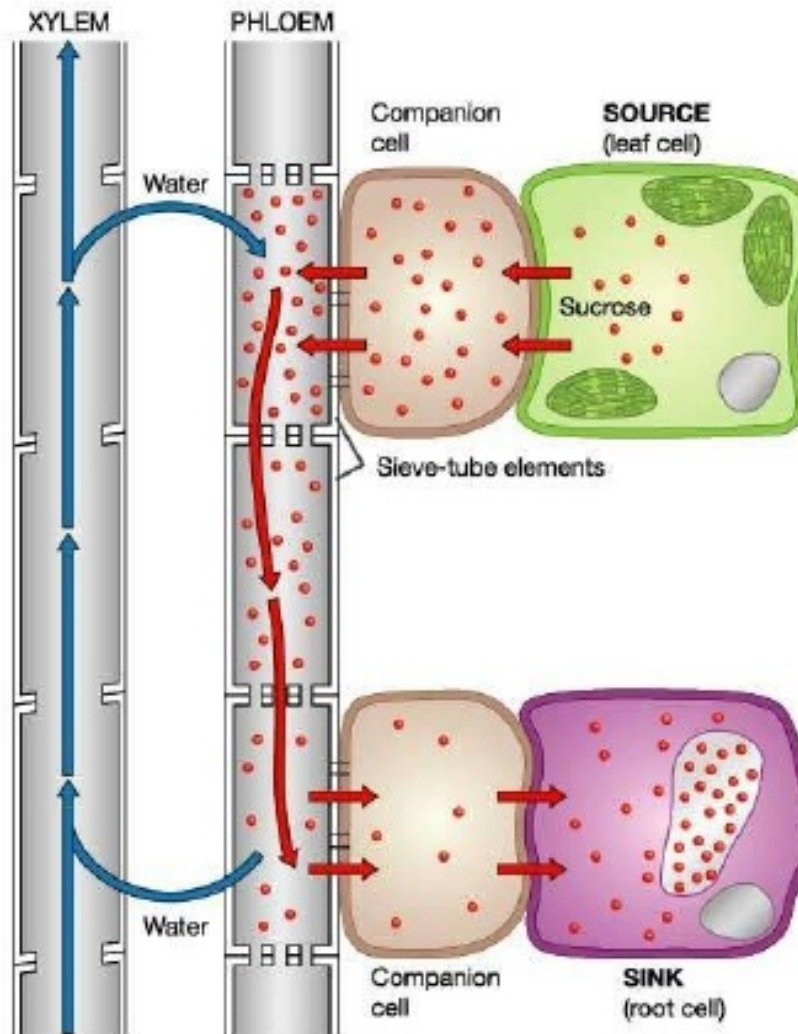


Transpiration Stream



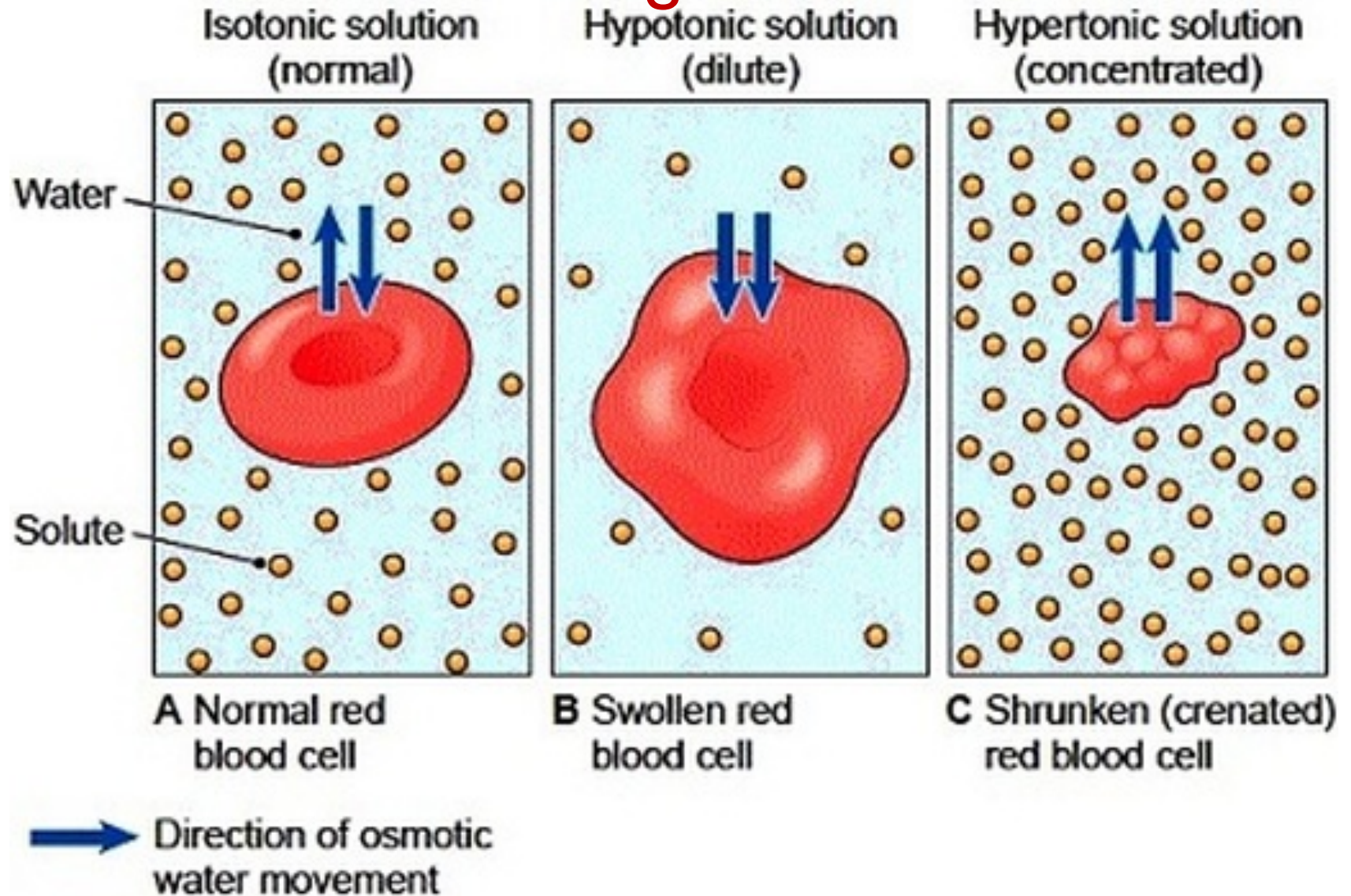


Pressure flow concept

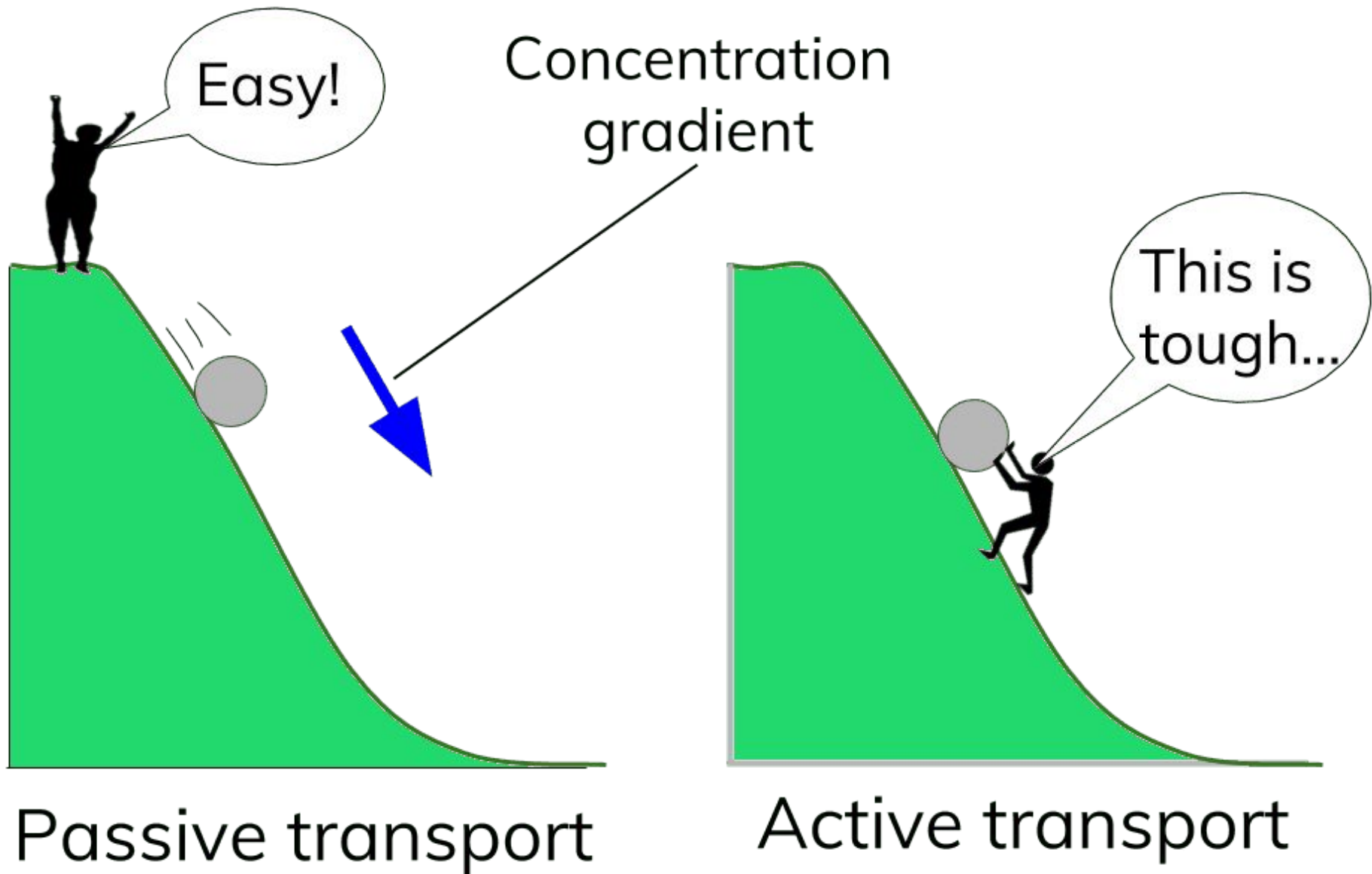


Osmosis

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Transport in a Cell



Transport in a Cell

