

Minerals: their role in plant derived human-health vitamins

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“90% of all human health problems are food related”

Rock et. al. 1996. J. Amer. Diet Assoc. 1996 96:693-703

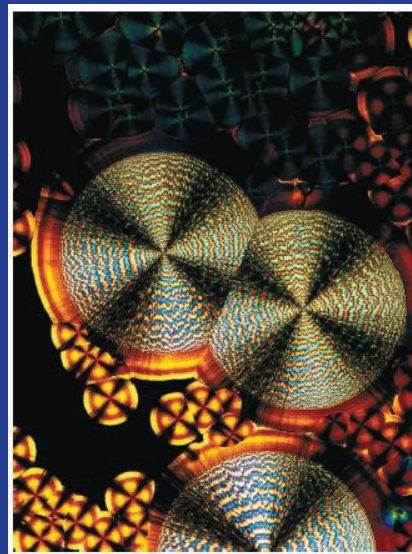
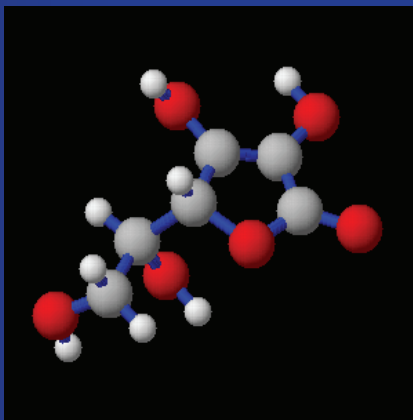
— and vitamin supplements are not the solution —

“The beneficial health link between vitamins and disease is due to their intake from food rather than from supplements”

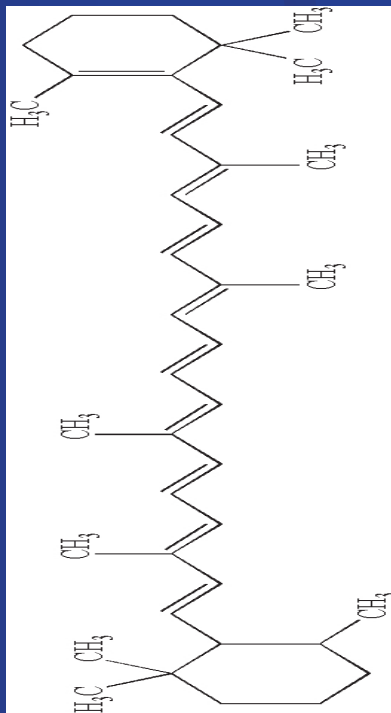


The most important vitamins

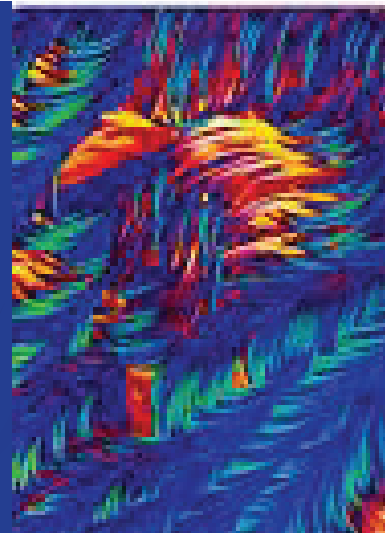
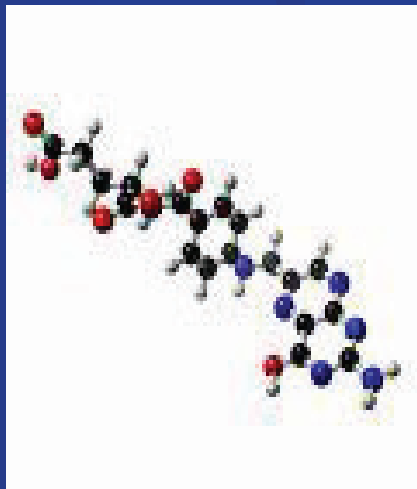
Vitamin C



Beta Carotene (pro vit. A)



Folic acid (vit. B9)



Ascorbic Acid (Vitamin C)

- A water-soluble antioxidant
- Maintains the immune system
- Reduces the severity of colds
- Reduces secondary viral or bacterial infections
- Reduces cardiovascular disease
- Lowers the risk of Alzheimer's
- Lowers the risk of atherosclerosis and stroke
- Fighting certain cancers

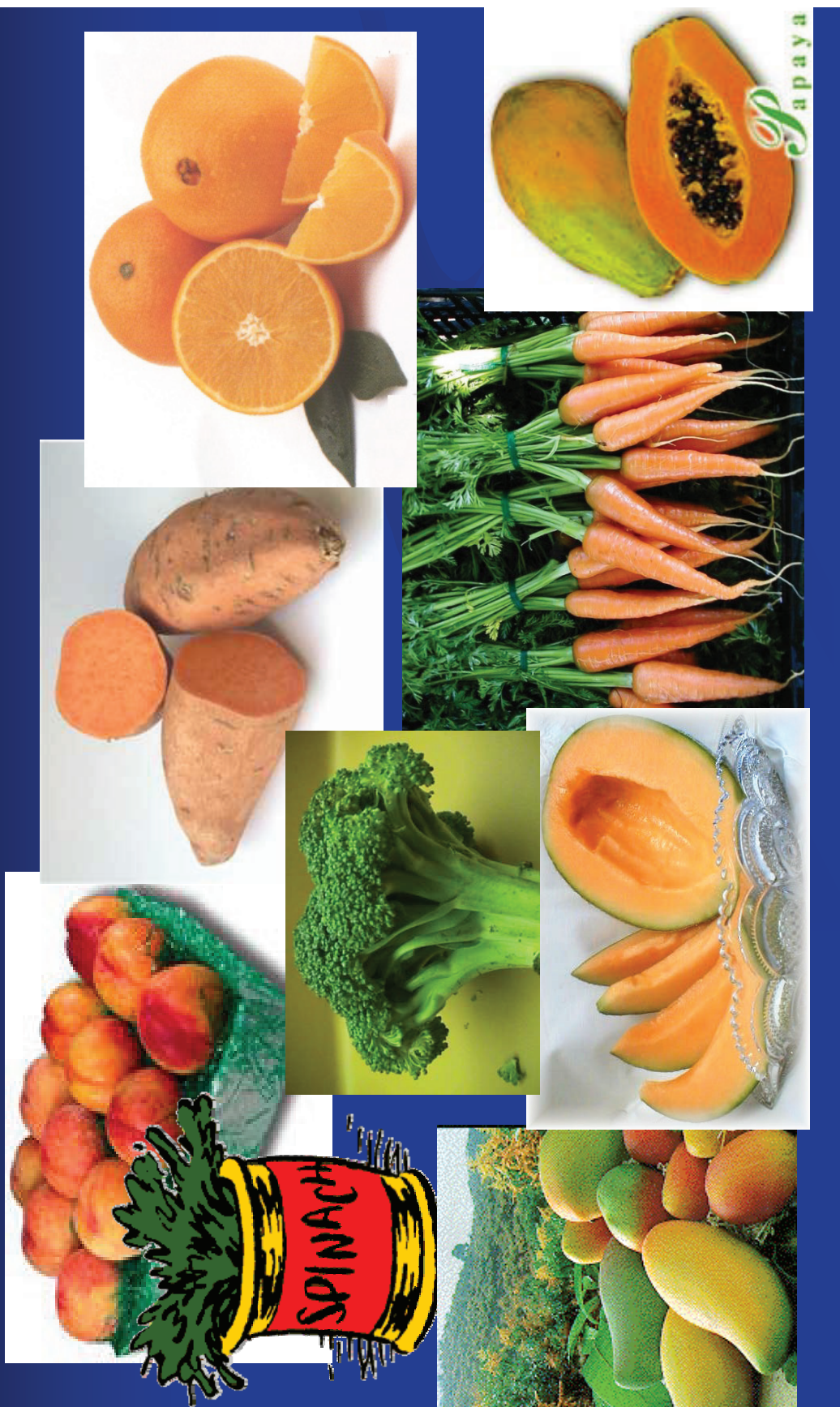
Ascorbic Acid – the richest food sources



Beta-carotene (pro-Vitamin A)

- **A fat-soluble precursor to vitamin A**
- **Powerful antioxidant**
- **Helps target & destroy cancer cells**
- **Reduces the risk of heart disease, stroke, cardiovascular disease, chronic fatigue syndrome, psoriasis, and lupus**
- **Necessary for human-eye light reception, prevention of night blindness and cataracts**

β -carotene (Pro-Vitamin A): the richest food sources



Folic Acid - (Vitamin B9)

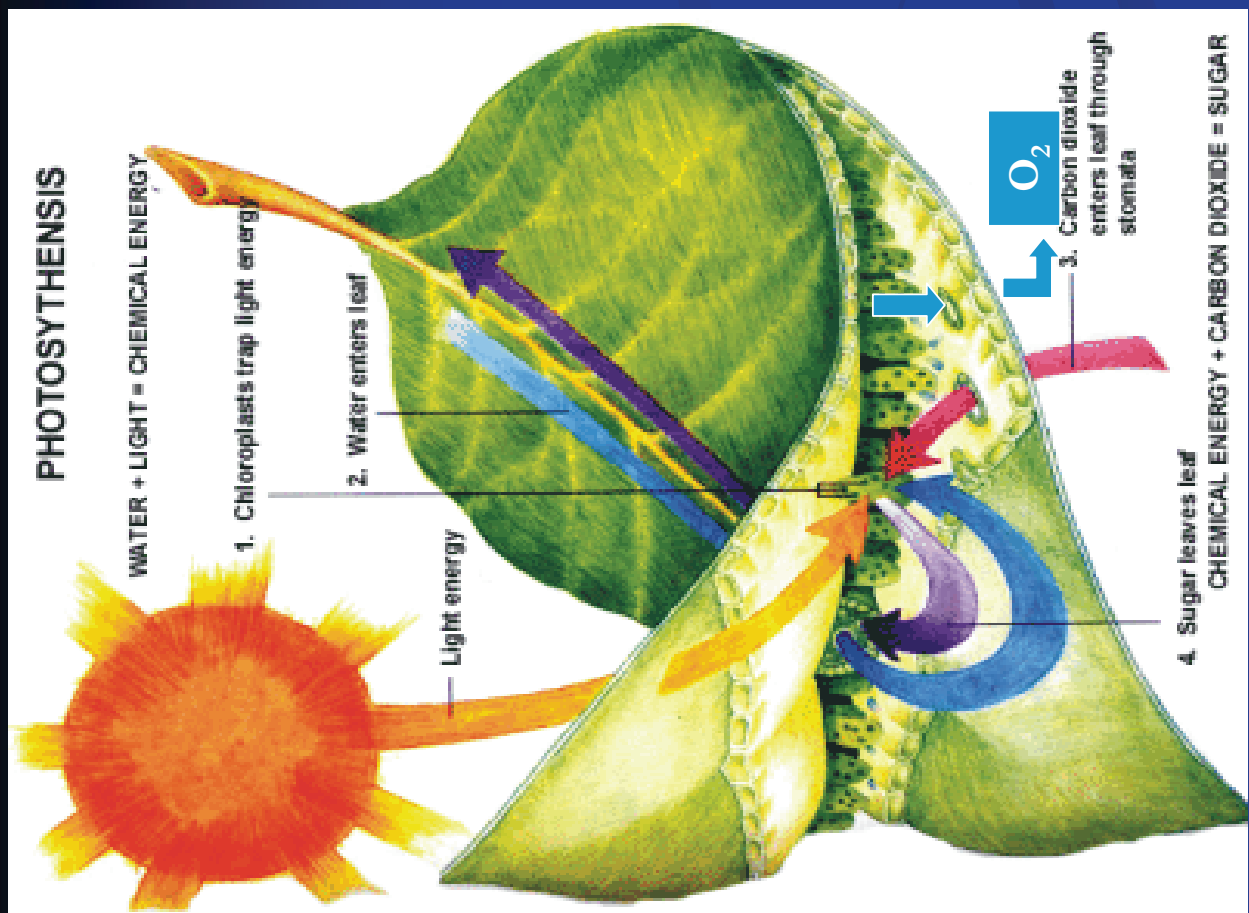
- Transports amino acids for protein chain creation
- Methylation of amino acids, DNA and RNA
- Regenerates methionine from homocystine – an important risk reduction factor in cardiovascular disease
- Regulates cell division & differentiation
- Regulates the central nervous system, mood, sleep, and appetite
- Involved in eliminating neural tube defects (spina bifida)

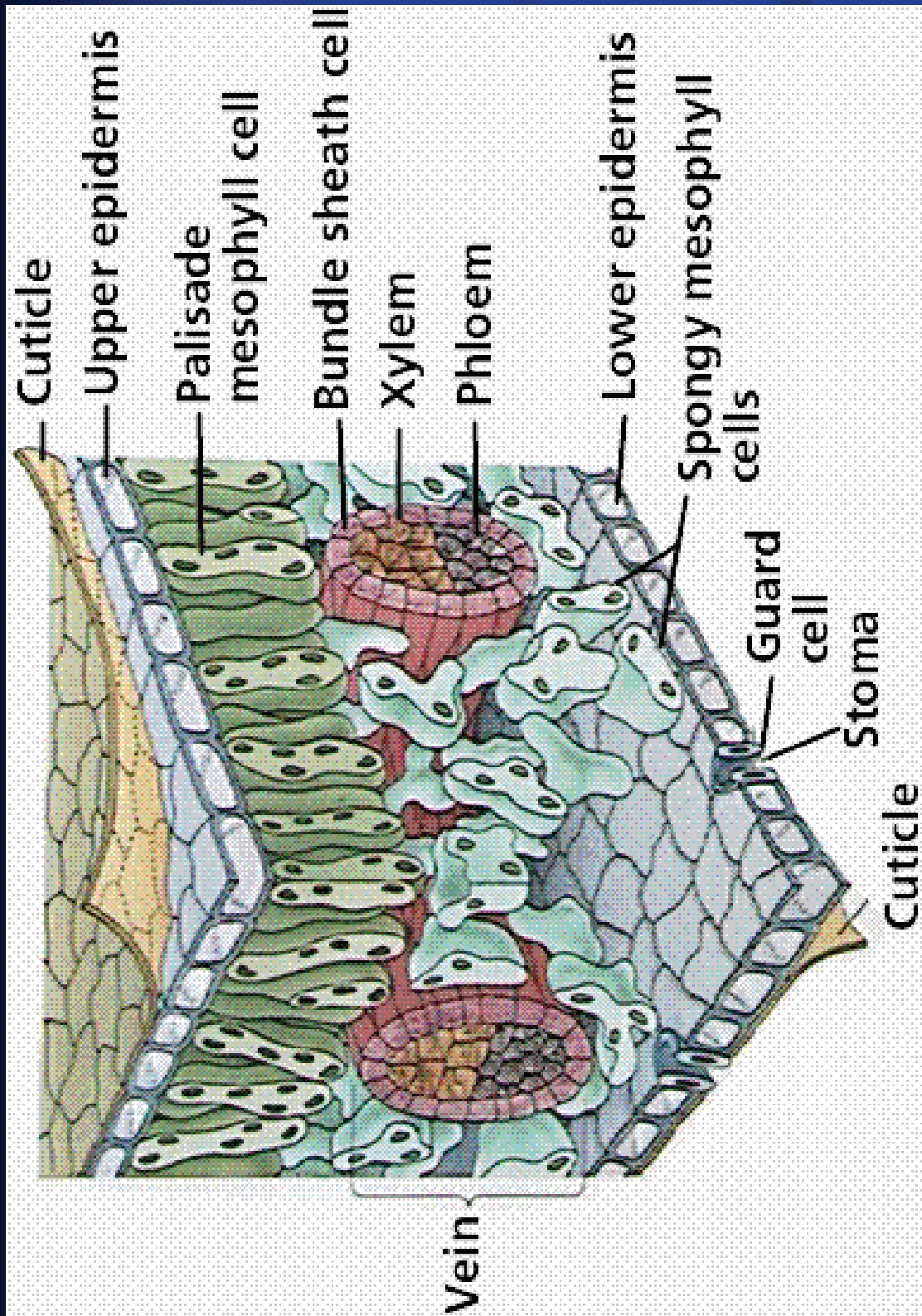
Folic acid : the richest food sources

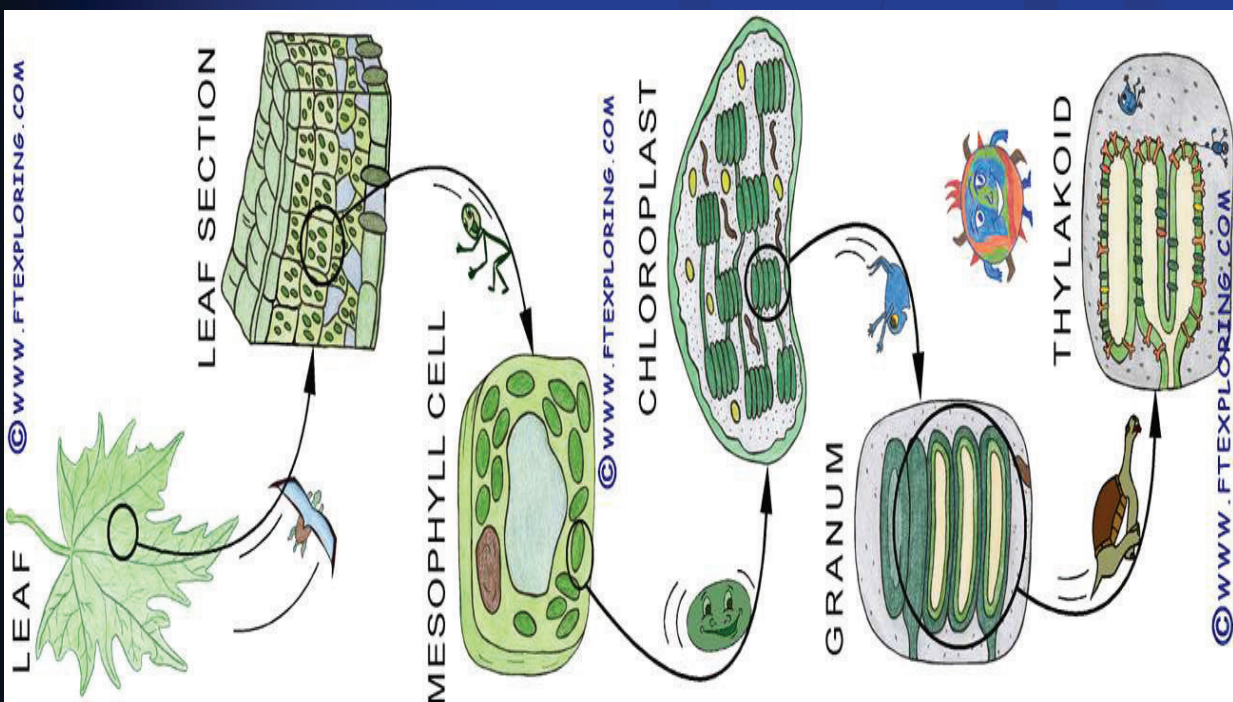


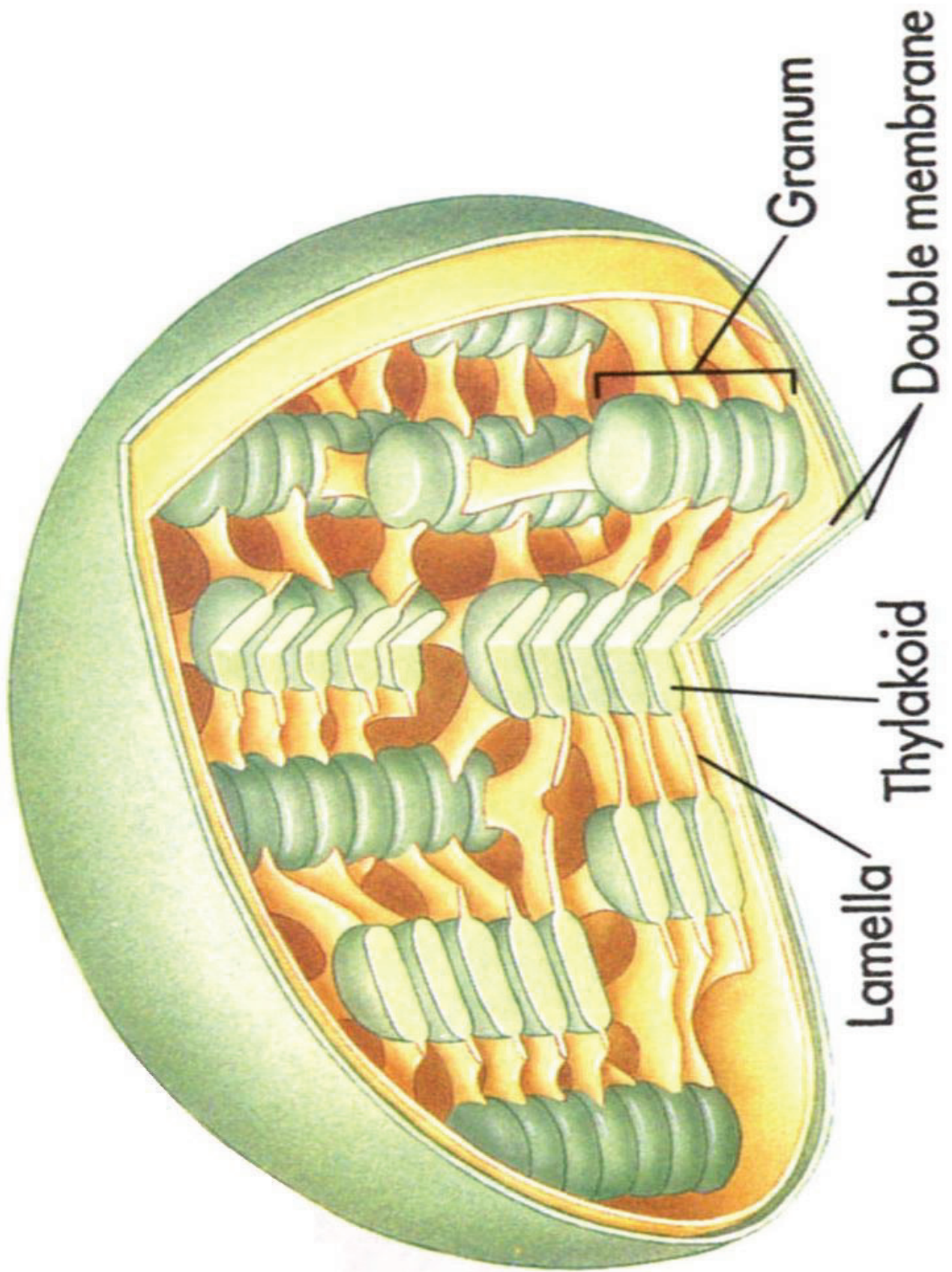
How and why are minerals involved in vitamins?

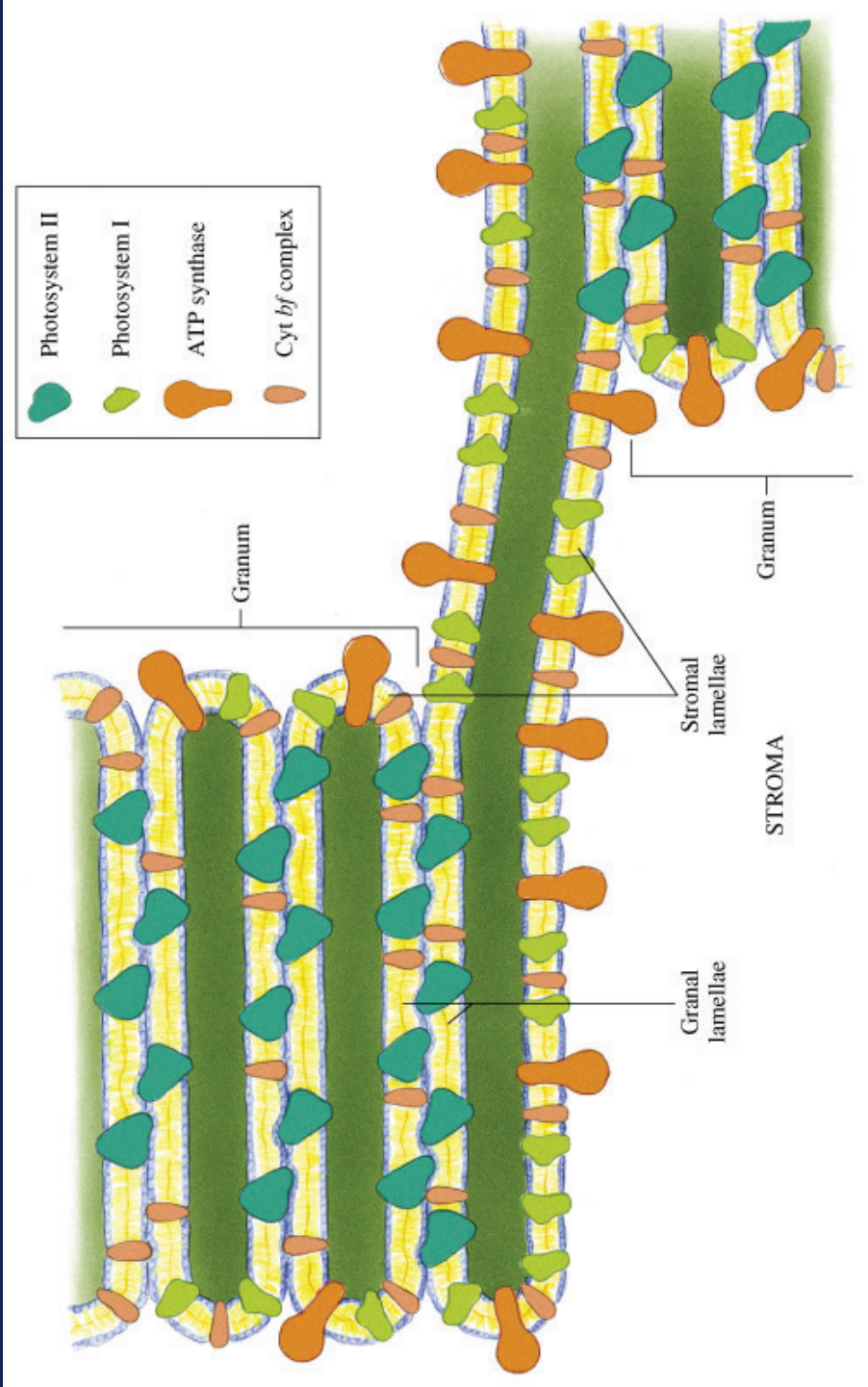
- It is all about photosynthesis



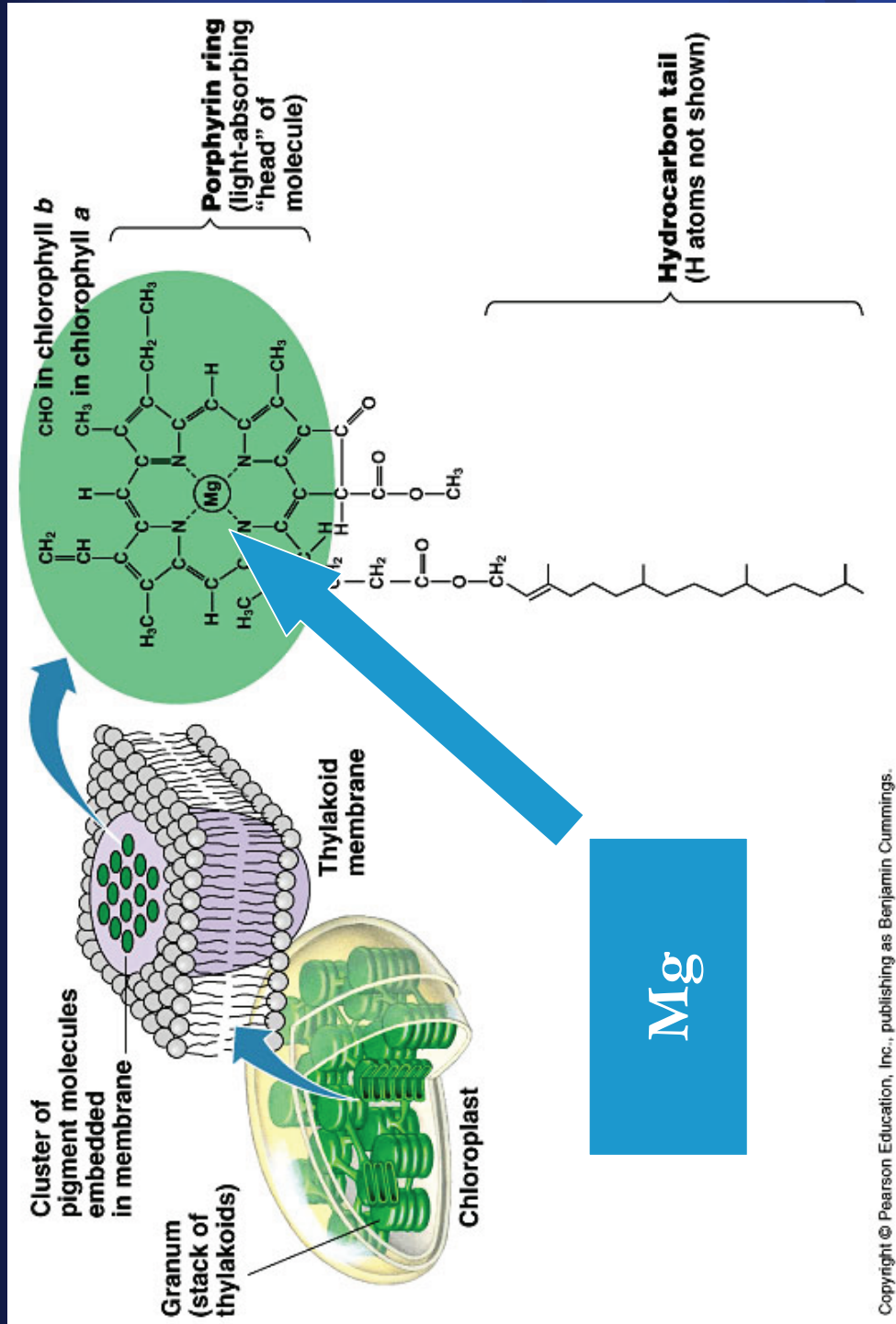




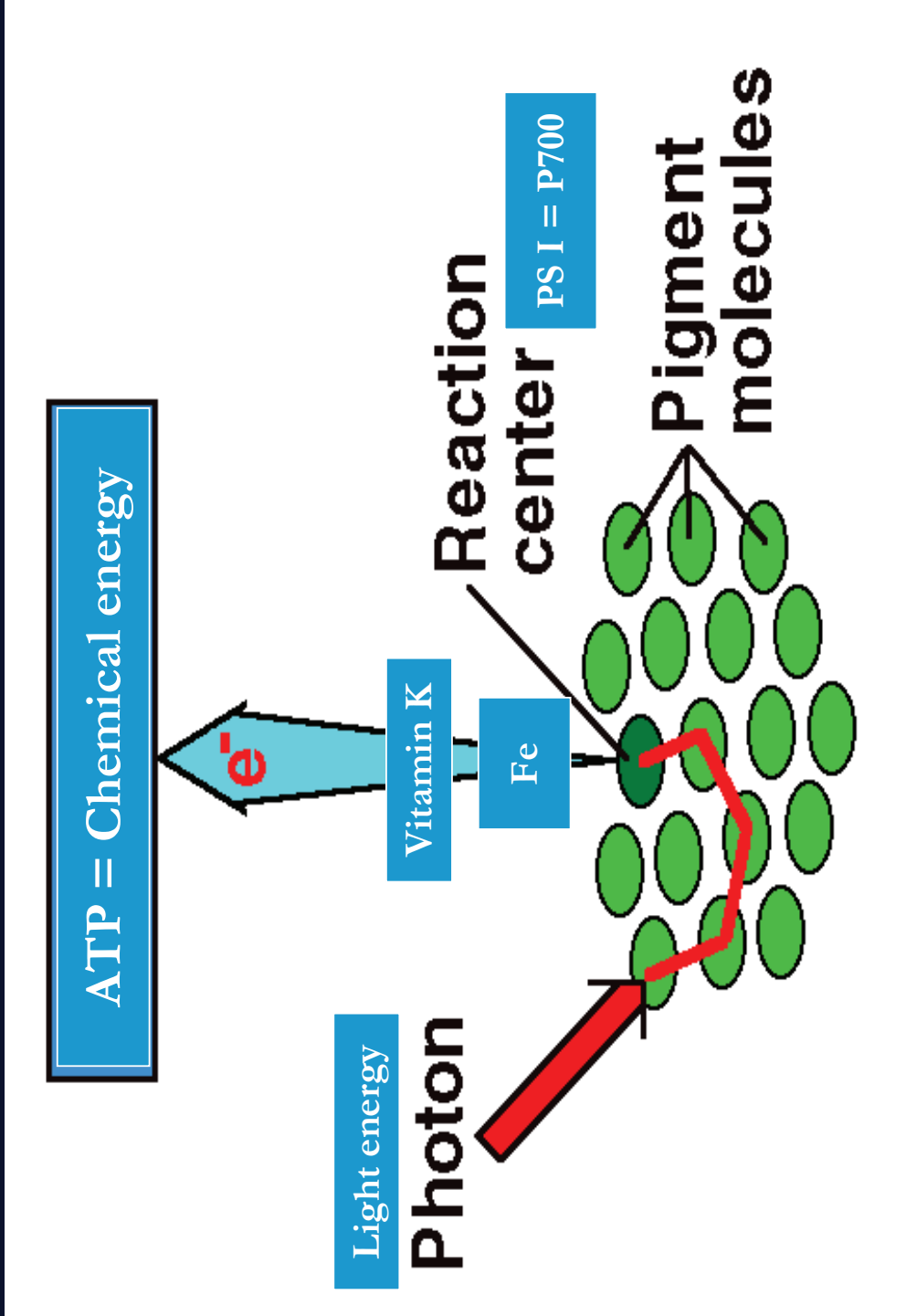






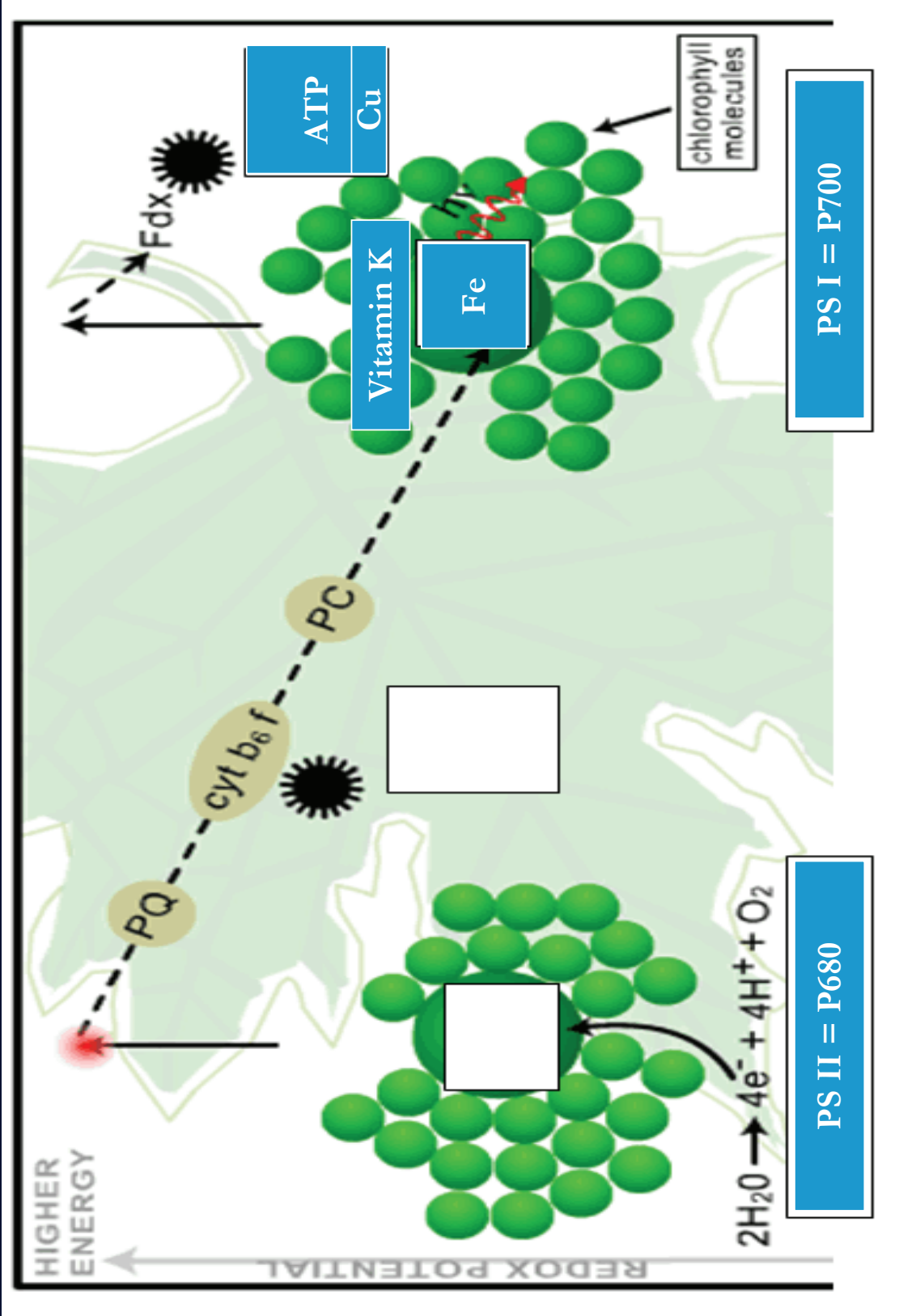


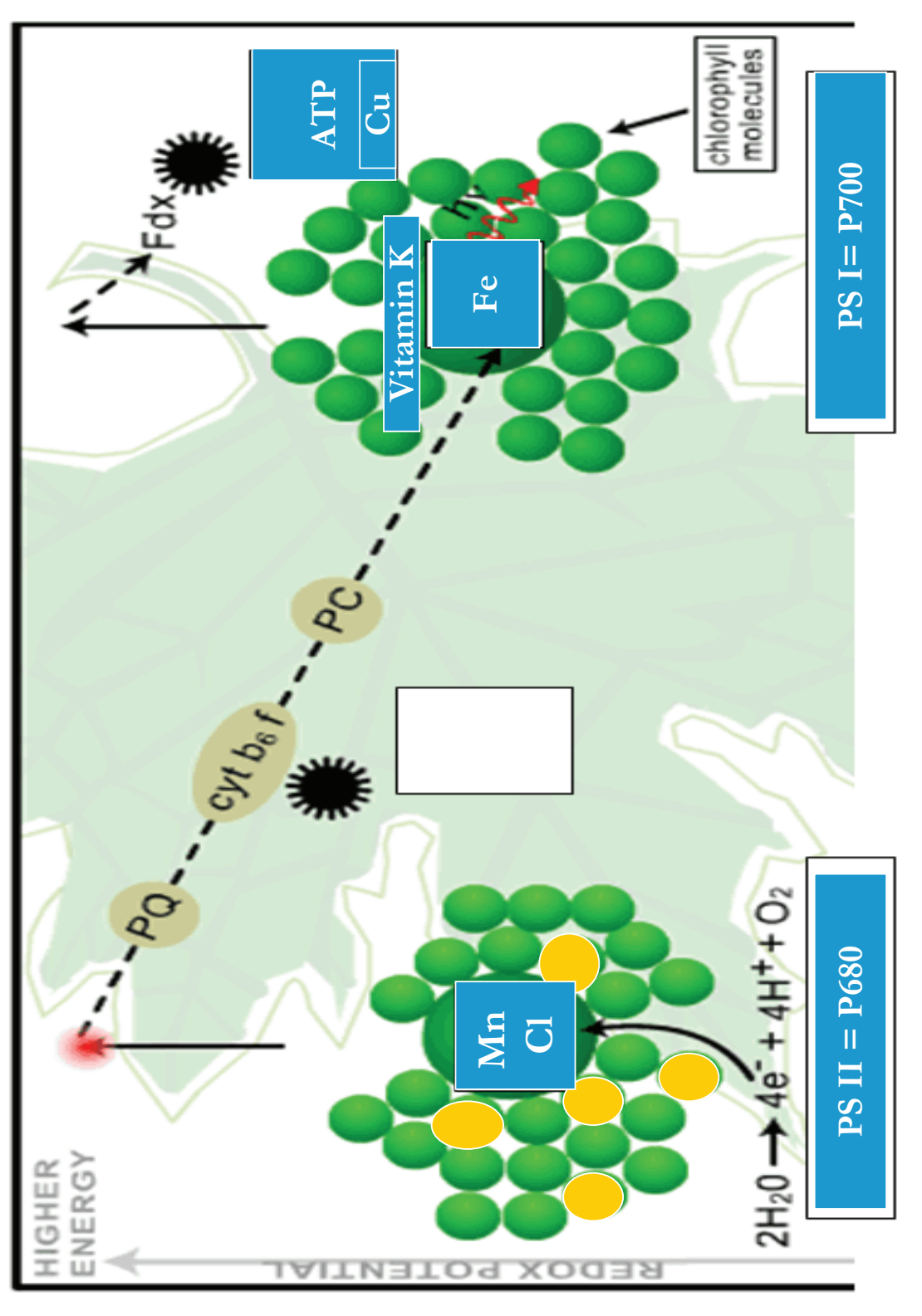
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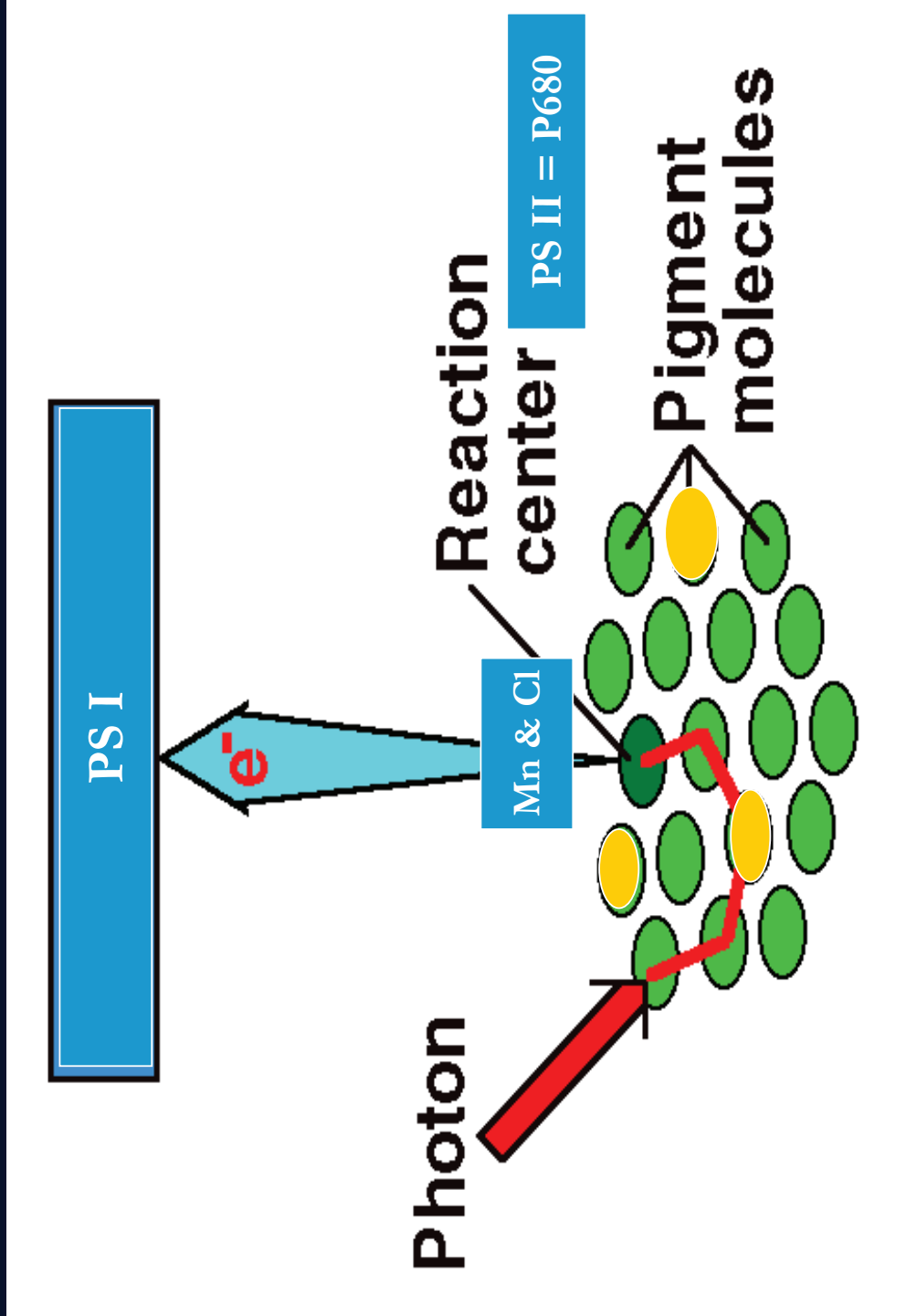


Sun light electron antennae molecules: Chlorophyll

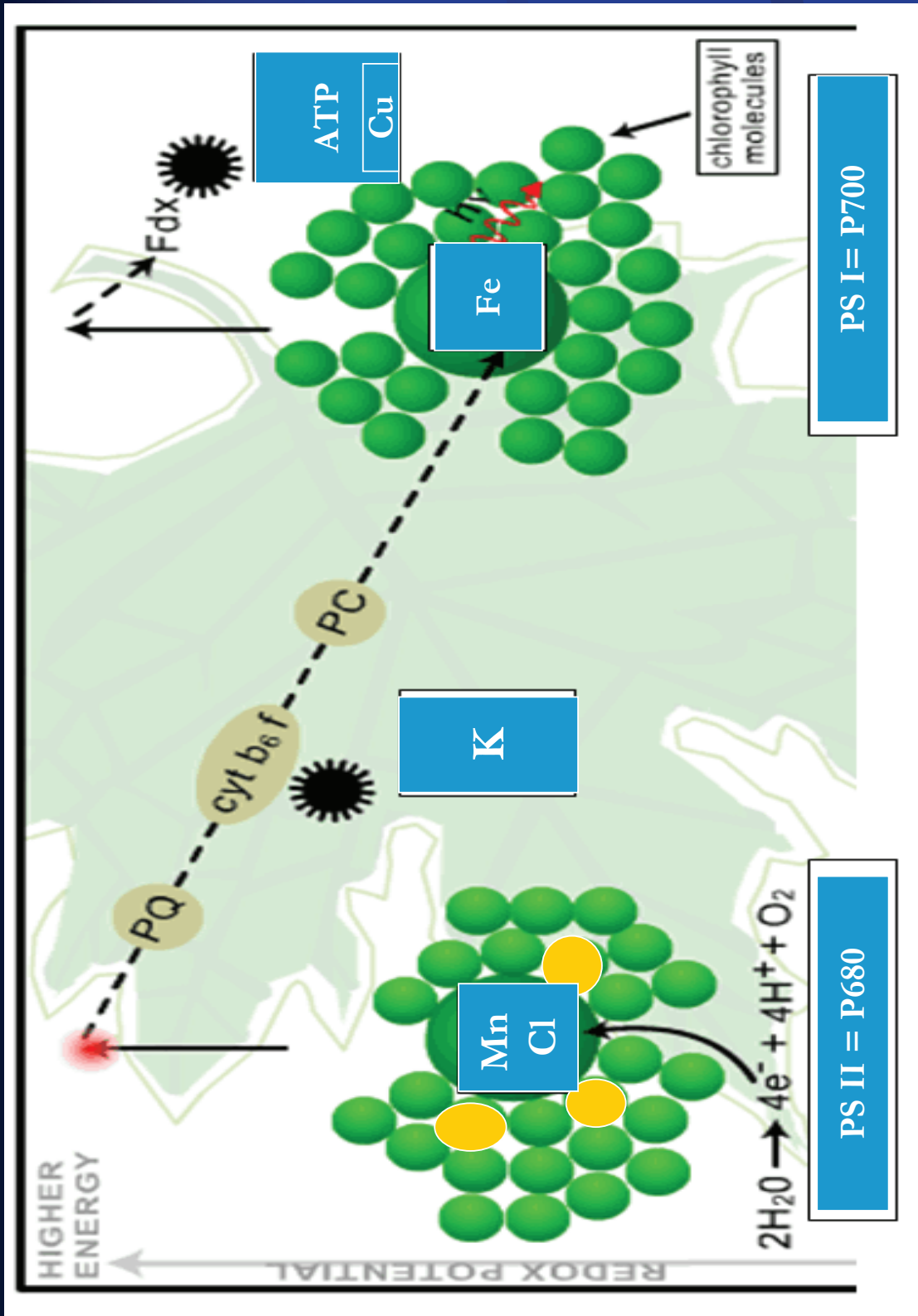


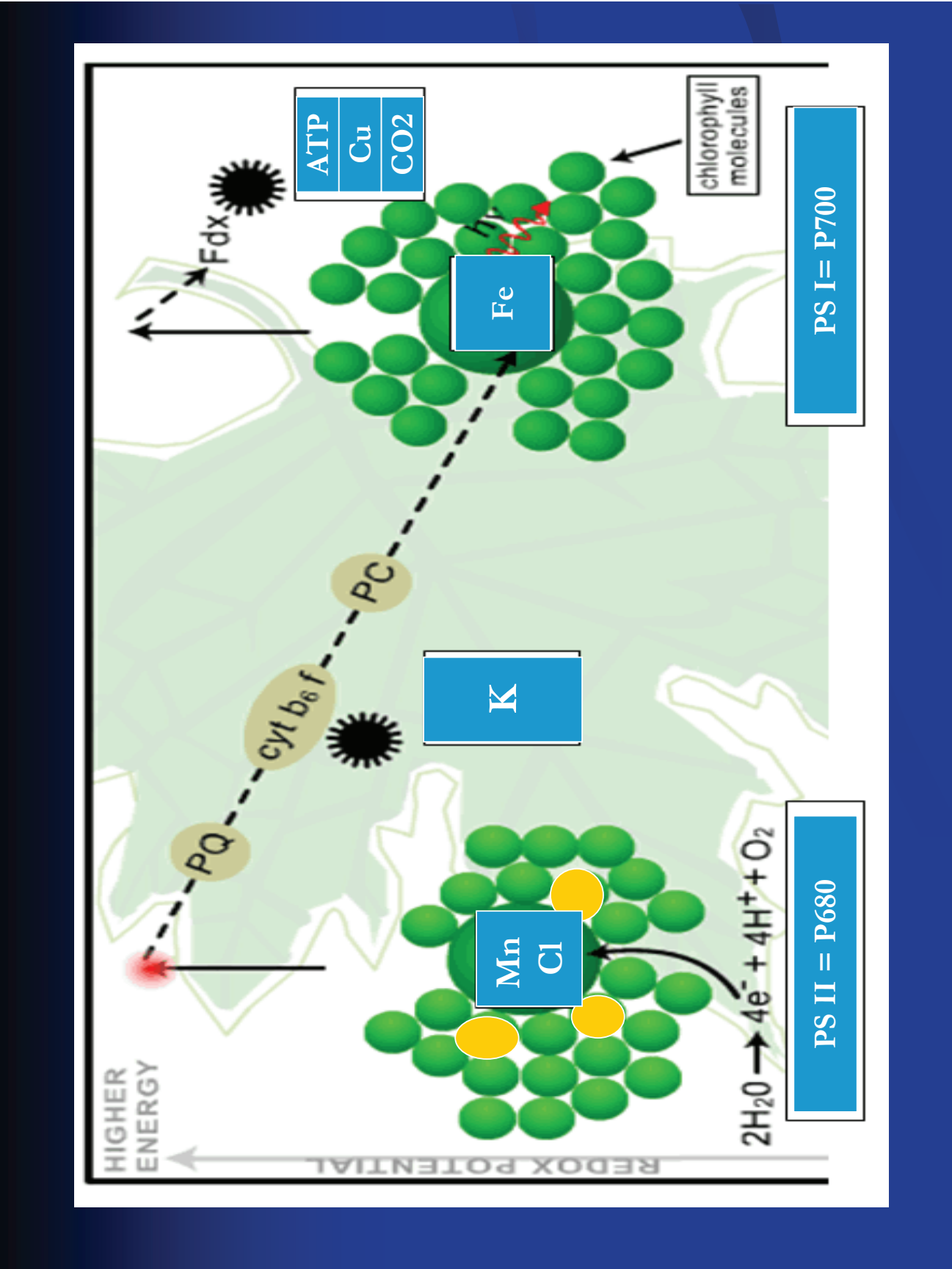


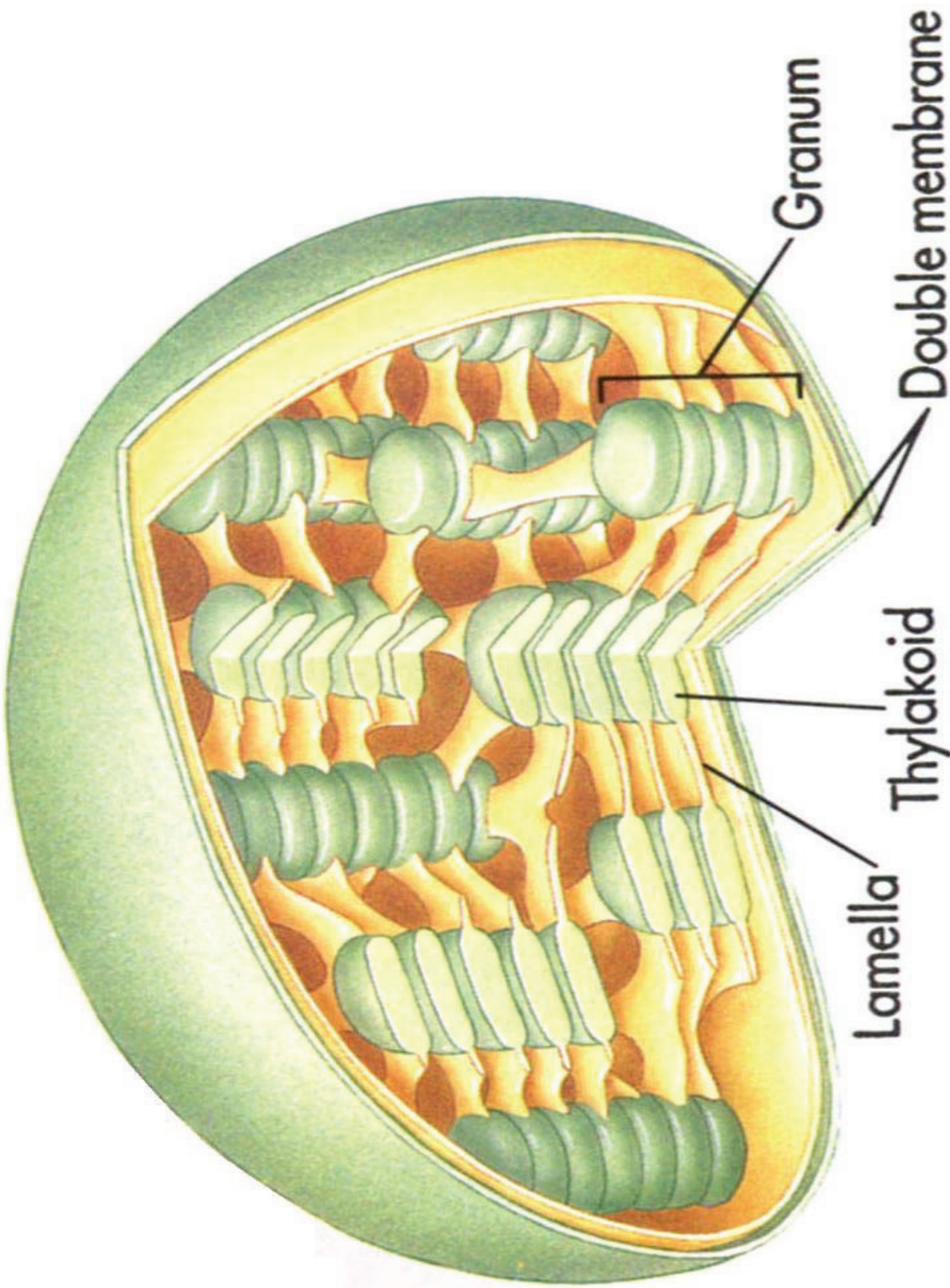


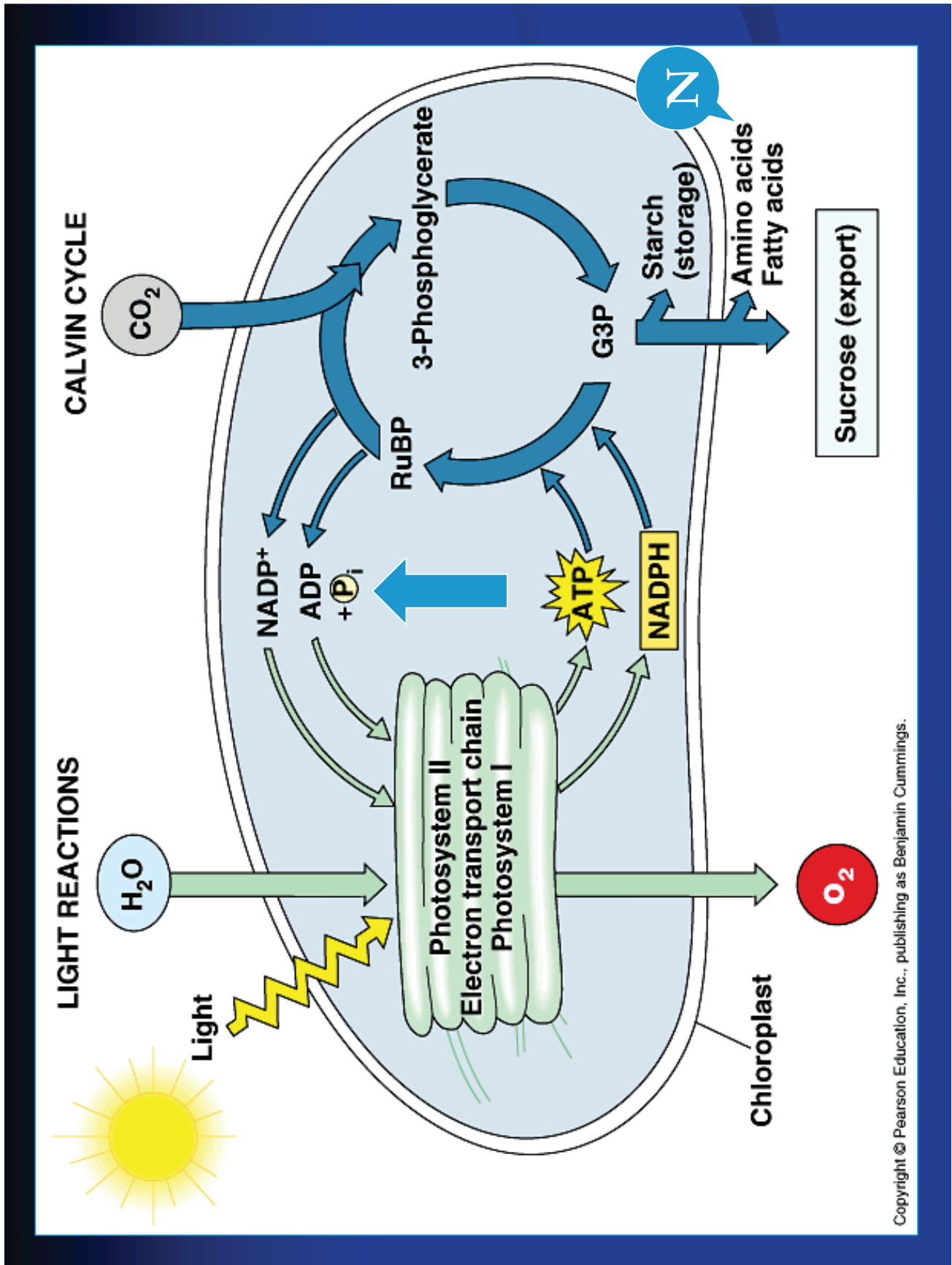


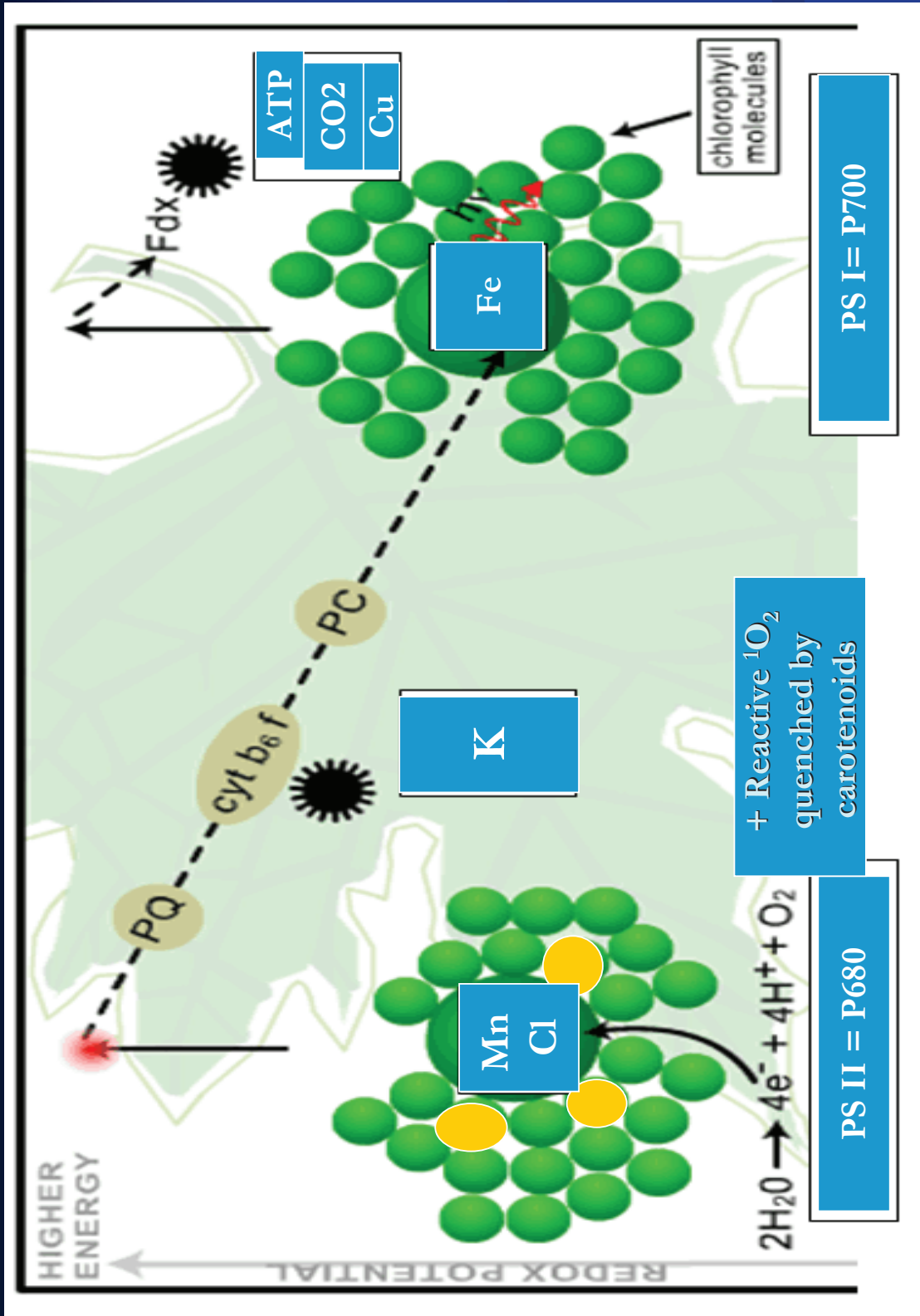
Sun light electron antennae molecules: Chlorophyll & carotenoids











OK, Beta- carotene, but why ascorbic acid and folic acid

- Ascorbic acid = AsA, synthesized from glucose outside of the chloroplast it recycles ascorbate peroxidase to clean-up reactive oxygen species in PS I

- Folic acid, synthesized in the chloroplast stroma & provides the methyl groups in the Calvin cycle RuBP, and to AdoMet in ethylene synthesis

Role of minerals

- Potassium (K): coenzyme in sugar, Vit. C folic acid & carotenoid synthesis.
- Iron (Fe) coenzyme in chlorophyll, carotene, protein, phenol, lignin & PS I
- Manganese (Mn) coenzyme in carotenoids, sterols, amino acids, flavonoid & PS II
- Magnesium (Mg) central in Chlorophyll and folic acid synthesis

Take Home Lesson:

Eat your Fruits and Vegetables (2 cups of each per day)

Over 2000 year ago Hippocrates said:



“Let your food be your medicine and medicine be your food”

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