Ekofyziologie fotosyntézy
2013 jaro

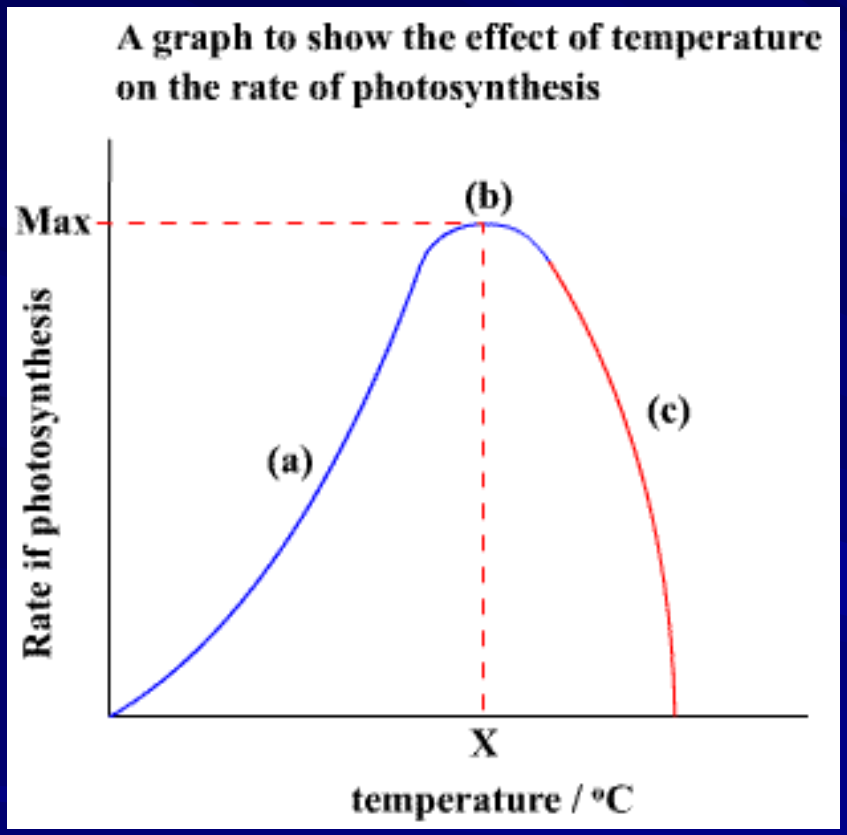
Fotosyntéza ve vztahu k vysokým teplotám

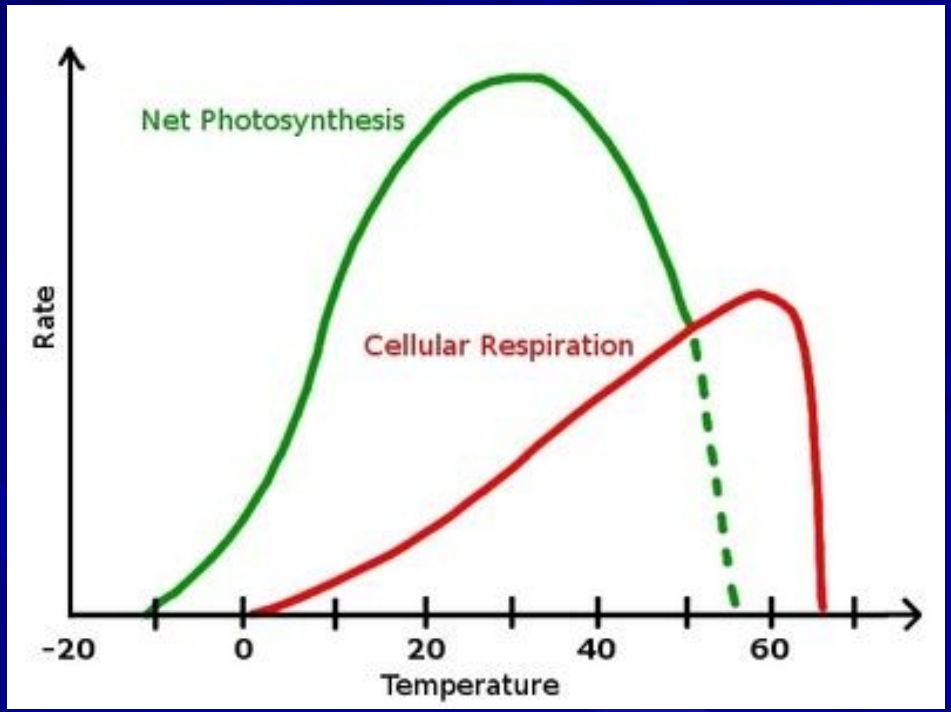
Enzymatické regulace

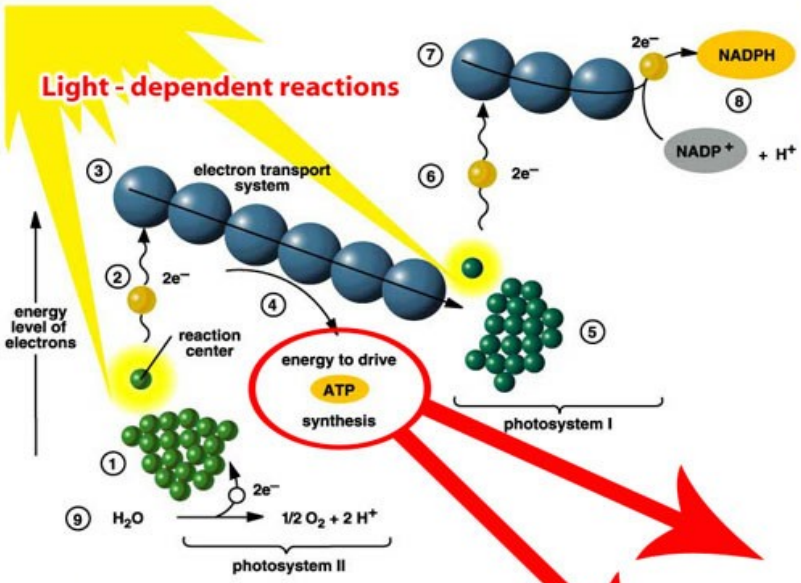
Miloš Barták

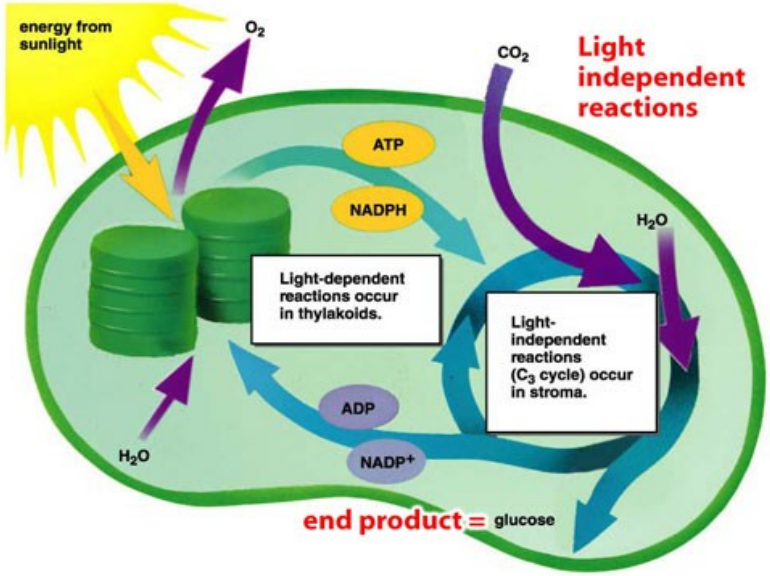
OFAR ÚEB PřF MU Brno
Laboratoř fotosyntetických procesů

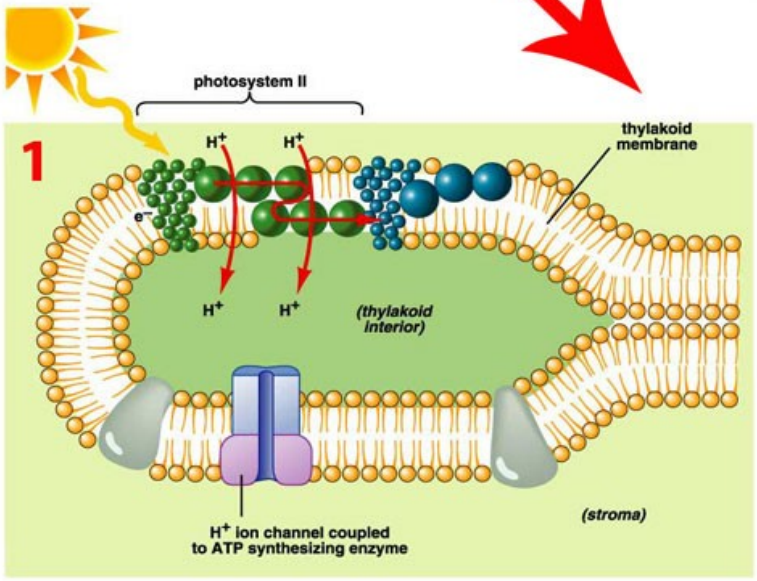
Temperature-response curve

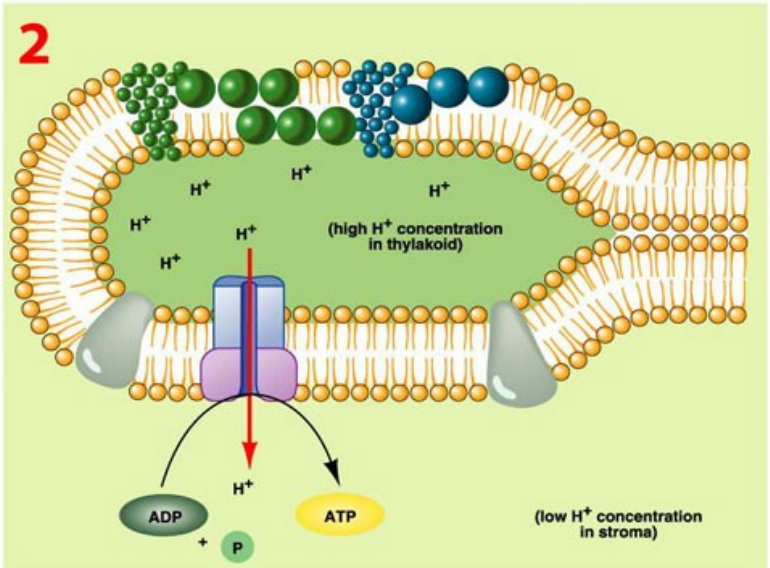





Light - dependent reactions
energy level of electrons
electron transport system
reaction center
energy to drive ATP synthesis
photosystem I
photosystem II
2e⁻
NADPH
NADP⁺ + H⁺
H₂O
1/2 O₂ + 2 H⁺

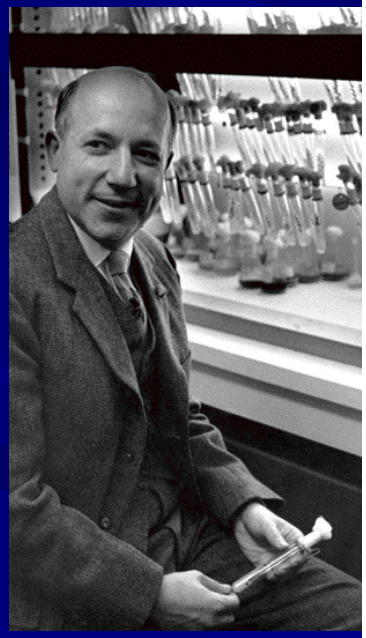

energy from sunlight
O₂
CO₂
Light independent reactions
ATP
NADPH
H₂O
Light-dependent reactions occur in thylakoids.
Light-independent reactions (C₃ cycle) occur in stroma.
ADP
NADP+
H₂O
end product = glucose

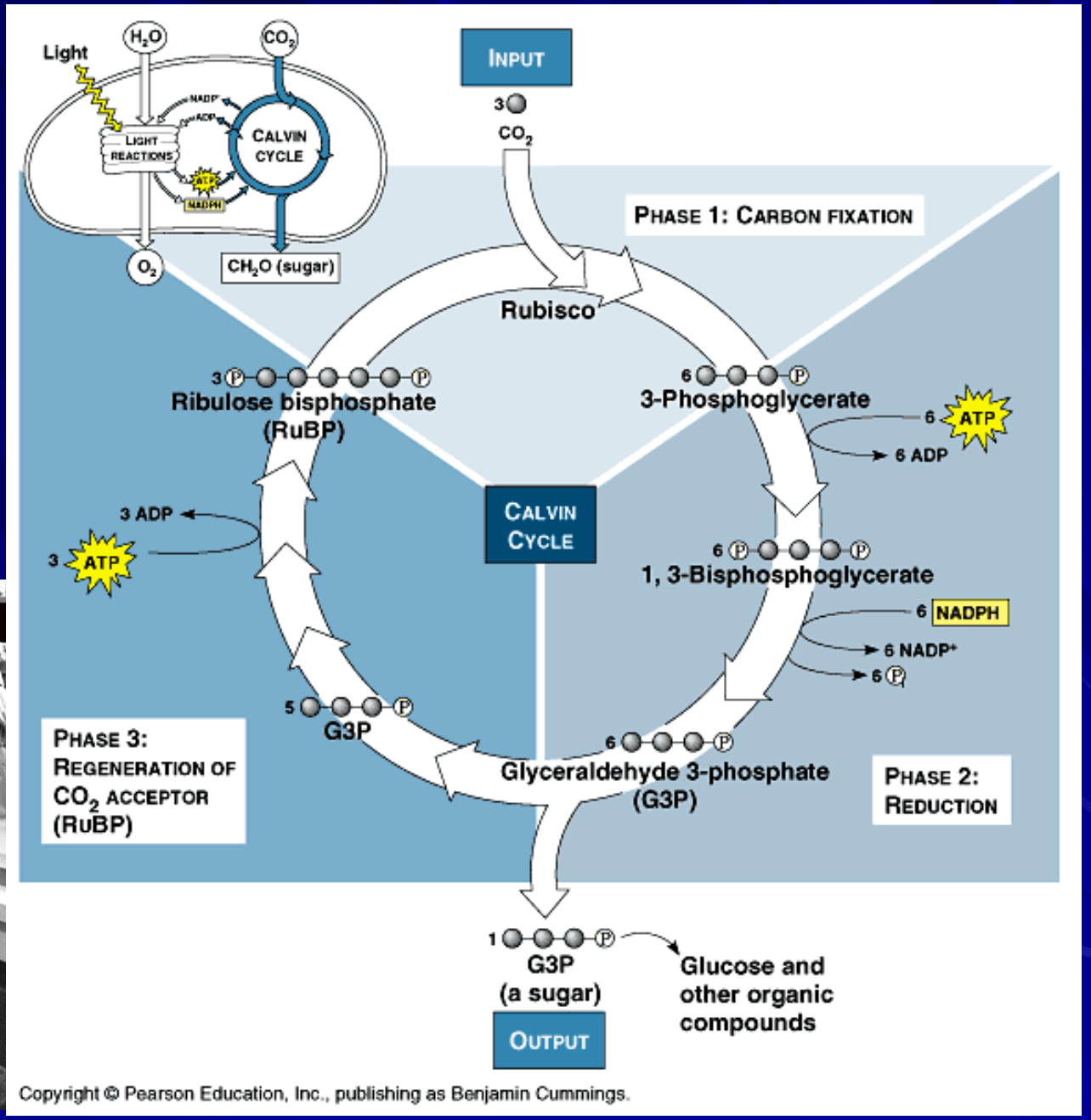

1
photosystem II
thylakoid membrane
H⁺
e⁻
(thylakoid interior)
(stroma)
H⁺ ion channel coupled to ATP synthesizing enzyme


2
H⁺
(high H⁺ concentration in thylakoid)
ADP
+ P
ATP
(low H⁺ concentration in stroma)

C3 fotosyntéza

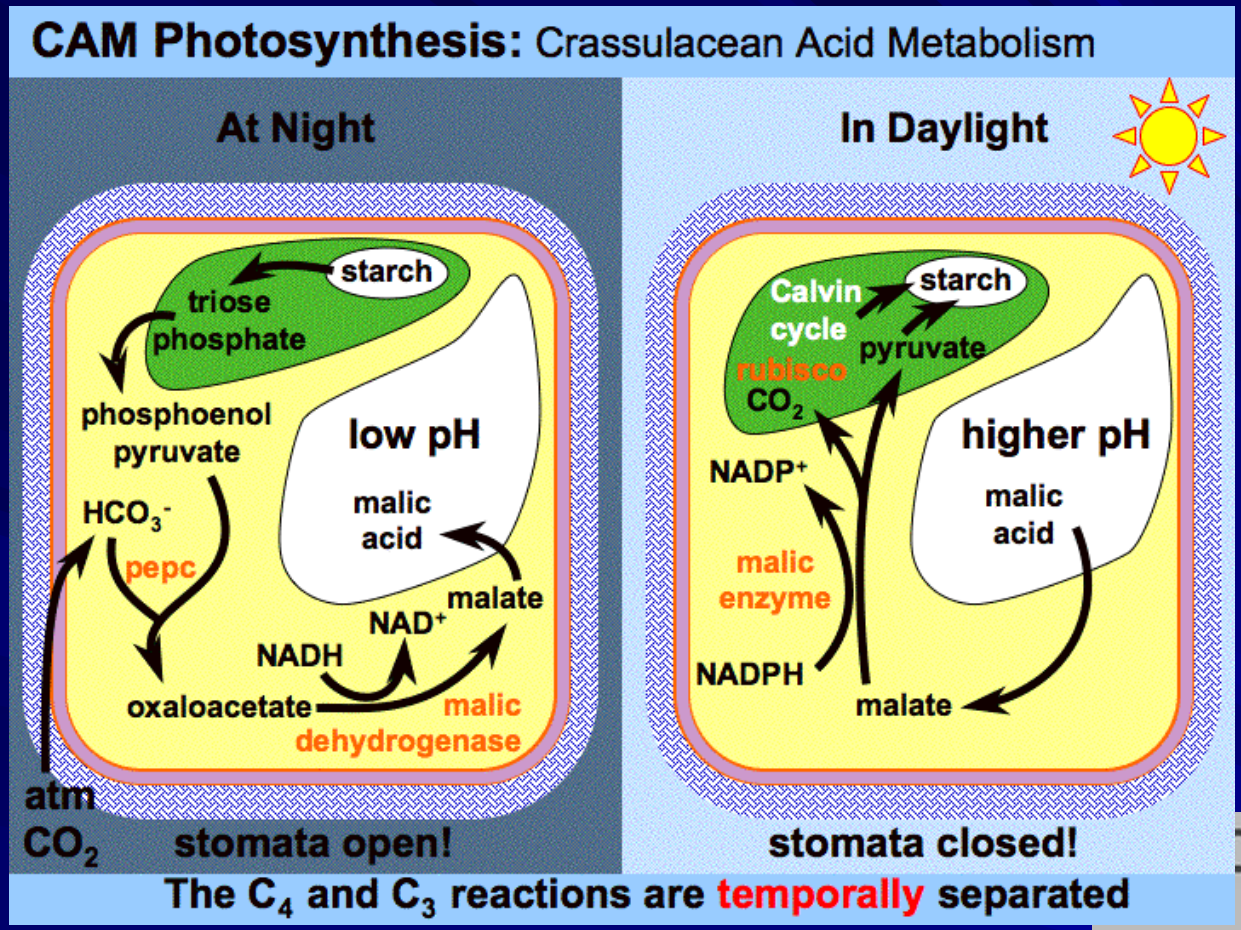
Calvinův cyklus

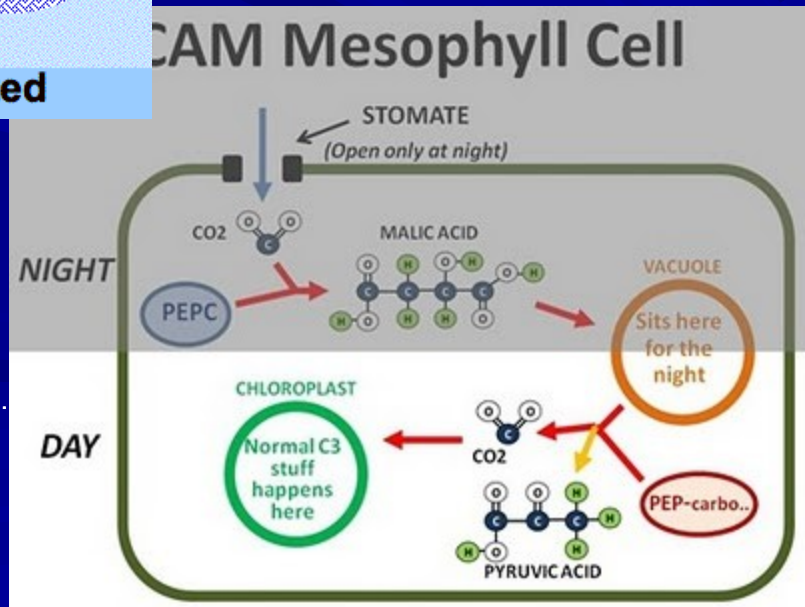




- http://fhs-bio-wiki.pbworks.com/w/page/12145795/Photosynthesis%20-%20light%20independent%20reaction

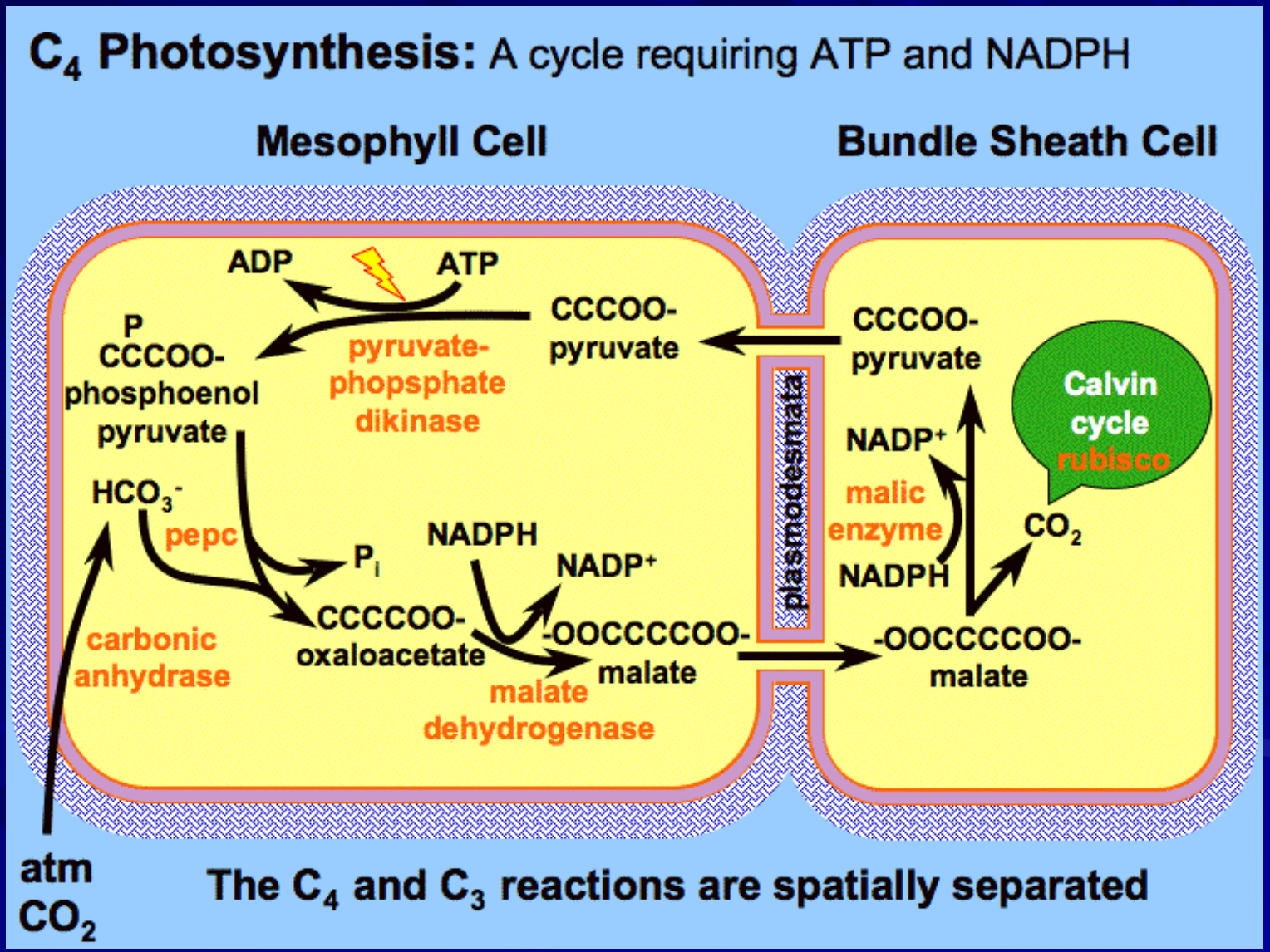
CAM



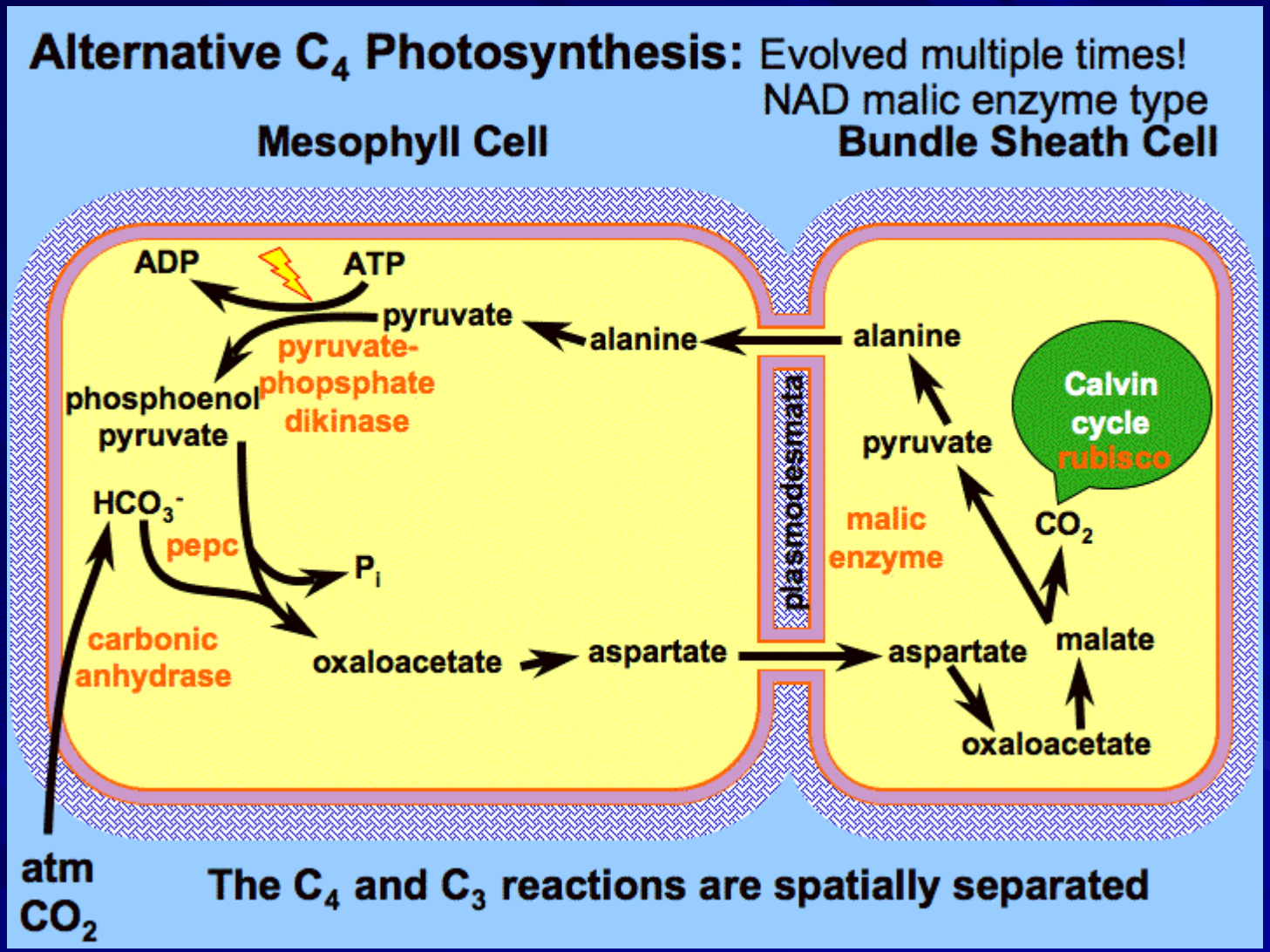


- http://silvana-v12.blogspot.com/2009/12/describe-process-of-photosynthesis-in.

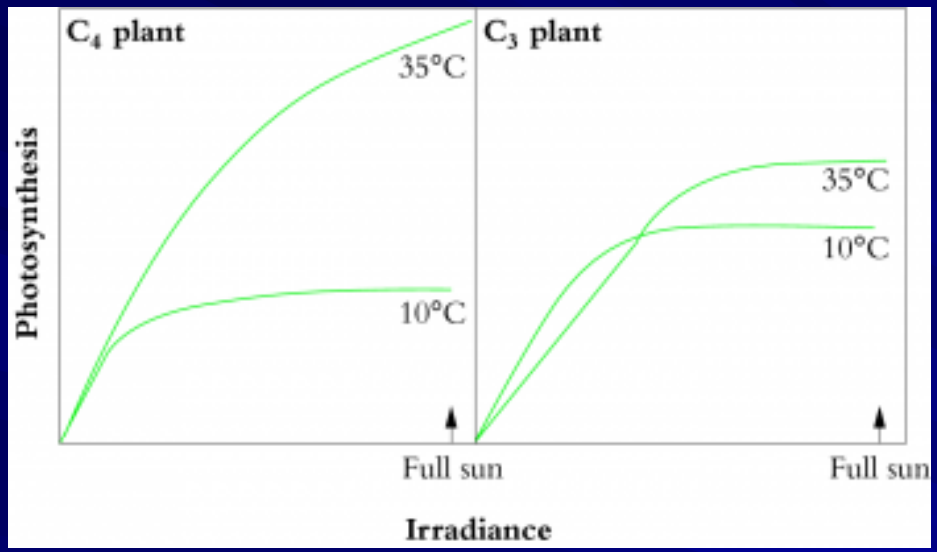
C 4

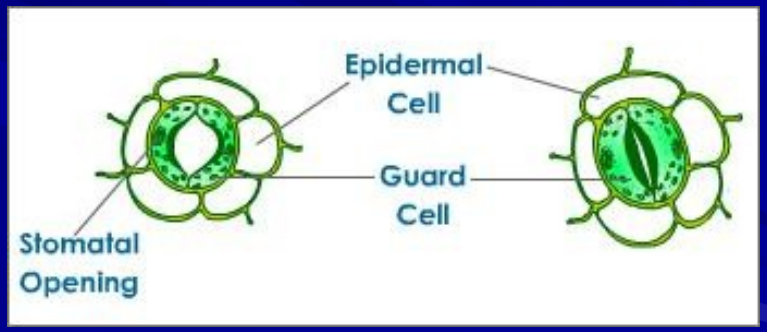


C 4



Stomatal limitation of photosynthesis





(Rubisco is the single most abundant enzyme on earth because it is used in ALL attachements of CO2 to RuBP)

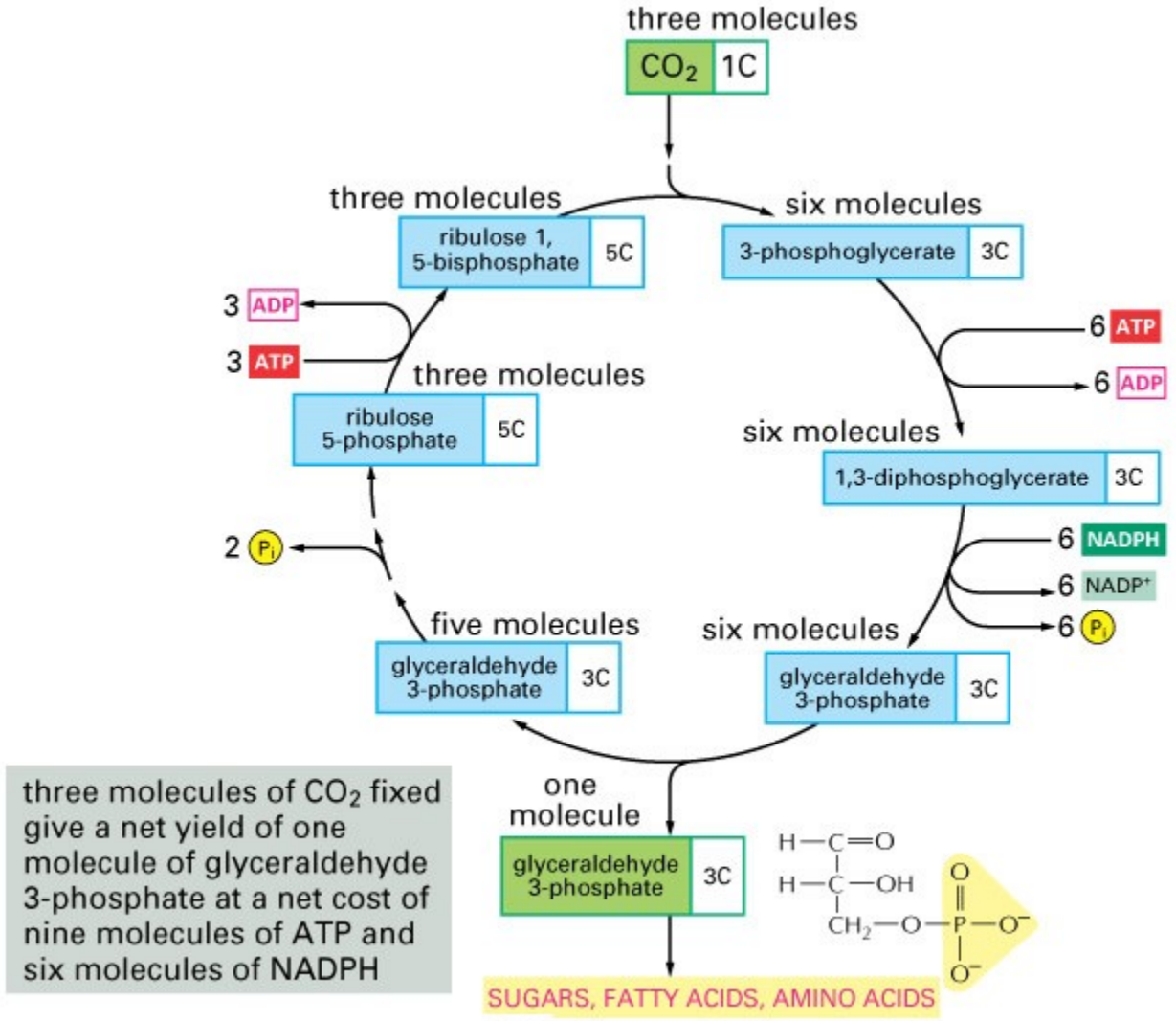
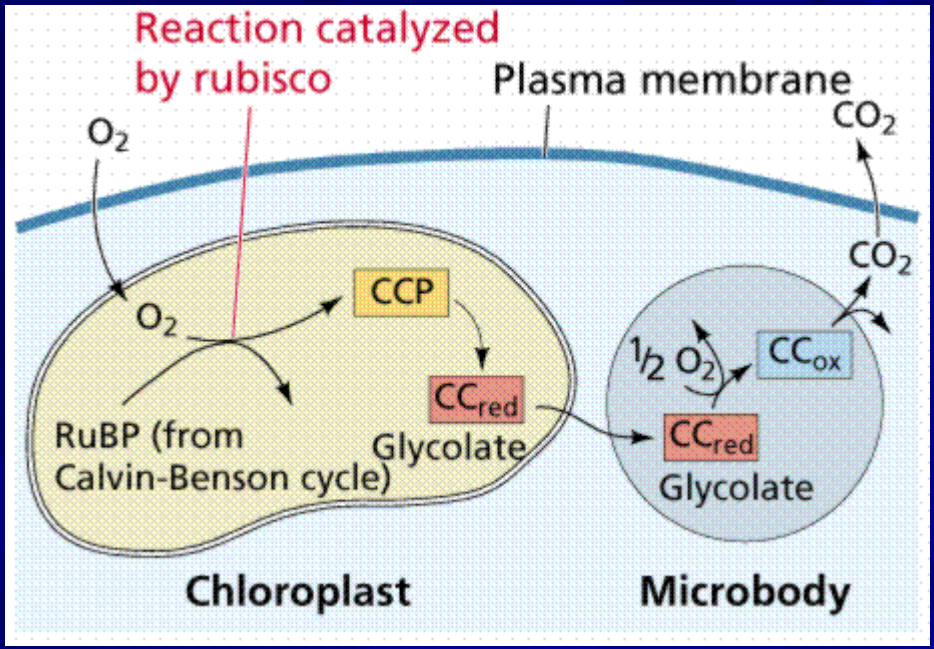


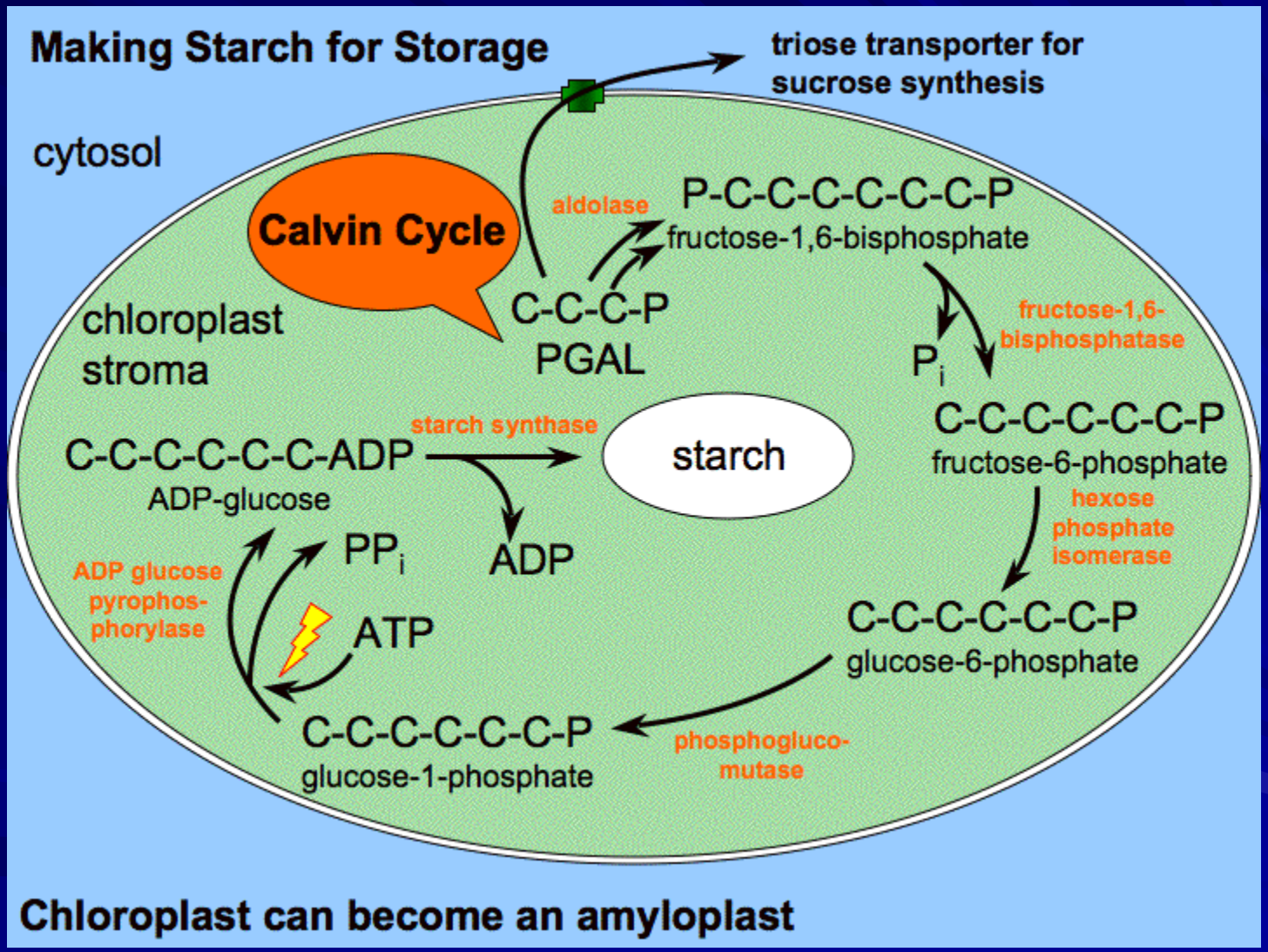
Figure 14-39 Essential Cell Biology, 2/e. (© 2004 Garland Science)

Fotorespirace



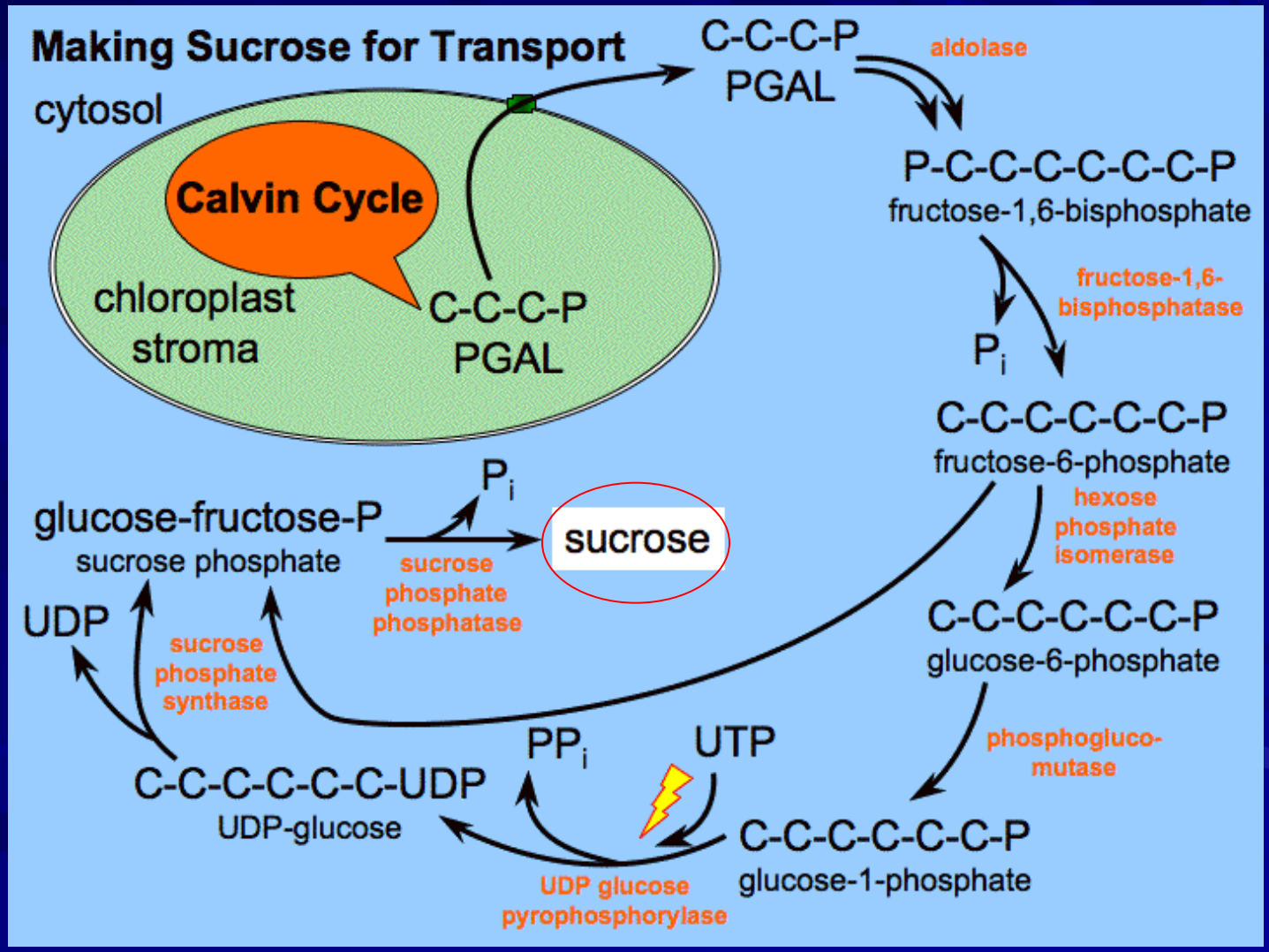
Fotorespirace nastává tehdy, je-li koncentrace CO2 uvnitř listu nízká. To se děje v horkých suchých dnech, kdy je rostlina nucena uzavřít své průduchy, aby tím zabránila nadměrné ztrátě vody. Jestliže se list snaží fixovat CO2 i když jsou zavřené průduchy, tedy dosáhne-li pokles koncentrace CO2 uvnitř listu zhruba 50 ppm, Rubisco začne interagovat s O2, RuBP namísto CO2.

Tvorba asimilačního škrobu



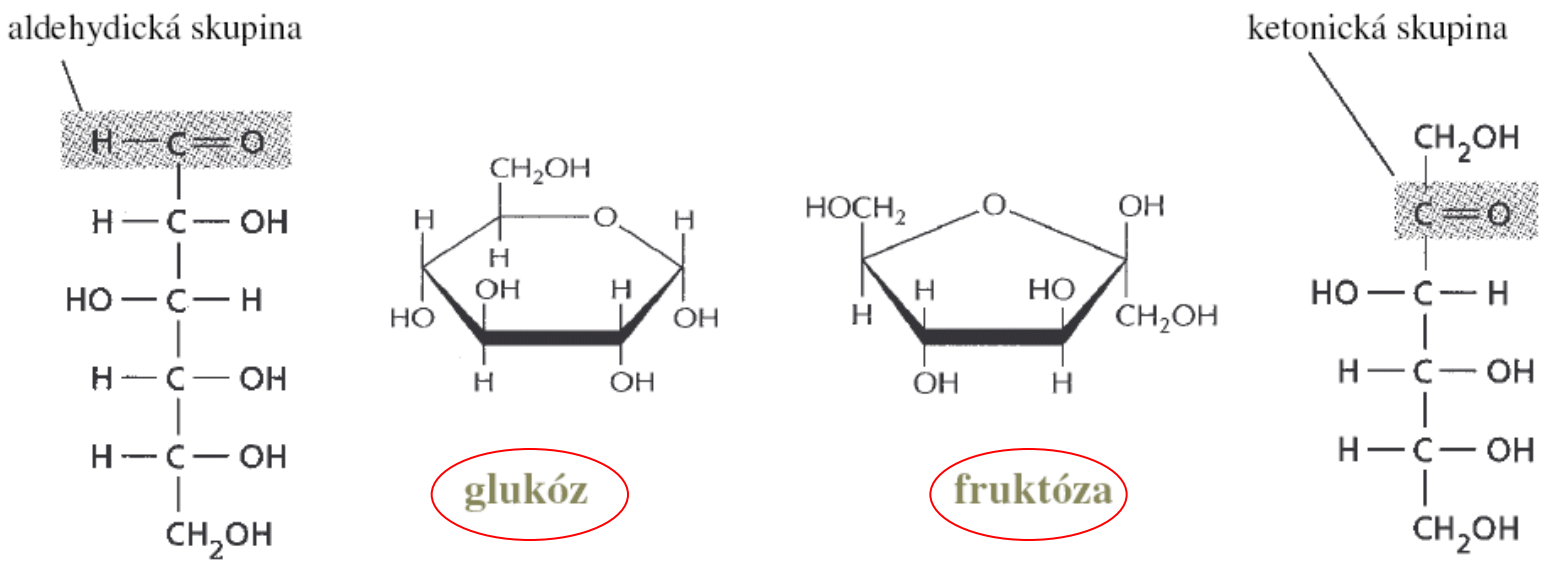
Zdroj obrázku: http://plantphys.info/plant_physiology/calvincycle.shtml

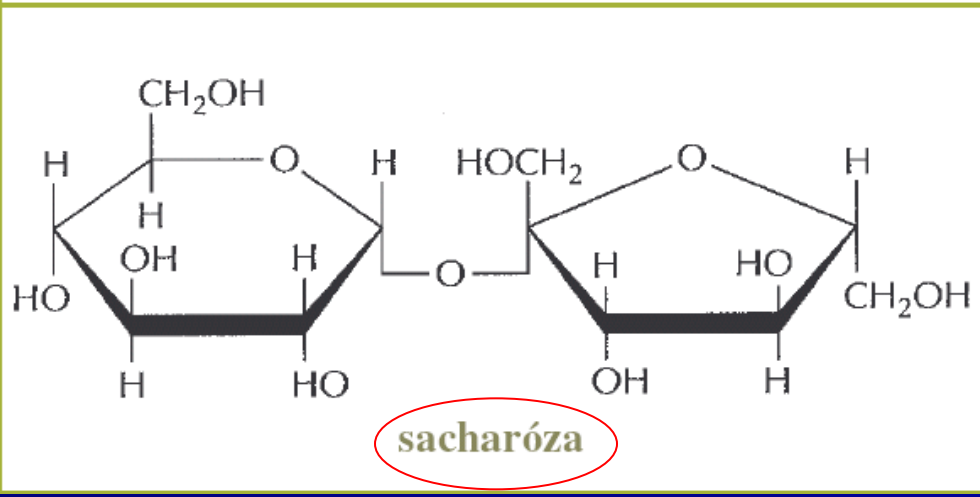
Tvorba transportních sacharidů



- Zdroj: http://plantphys.info/plant_physiology/calvincycle.shtml

Sacharidy : produkty fotosyntézy





- Grafika, zdroj: http://kfrserver.natur.cuni.cz/lide/edmunz/praktika_fr/mb130p13/navody/2_fotosynteza.pdf

Sacharidy

Chemicky jsou sacharidy definovány jako polyalkoholy s aldehydickou nebo ketonickou skupinou, která je u monosacharidů, ale i některých disacharidů a polysacharidů, volná a značně reaktivní. Pentózy a hexózy tvoří 5- nebo 6-členné cyklické molekuly.

Nejčastější hexózy jsou u rostlin - **glukóza** s aldehydickou skupinou

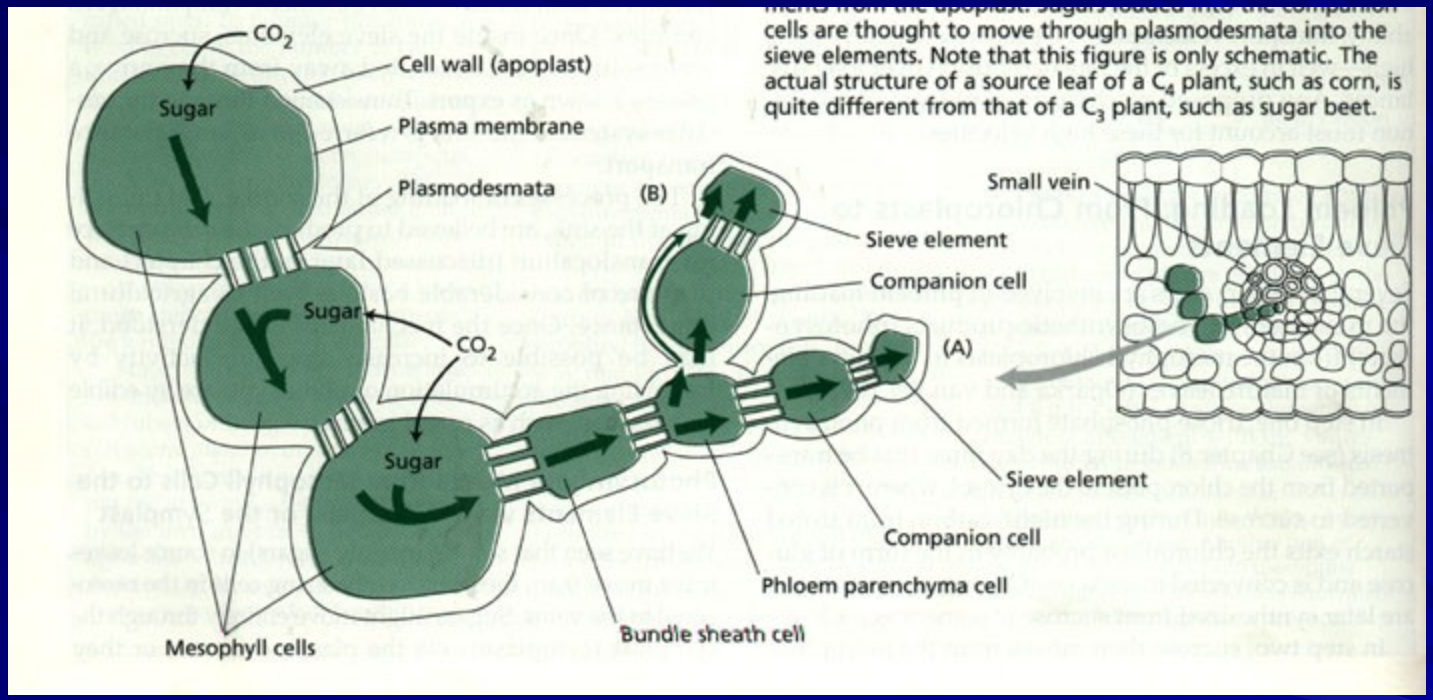
a **fruktóza** se skupinou ketonickou.

Disacharidy

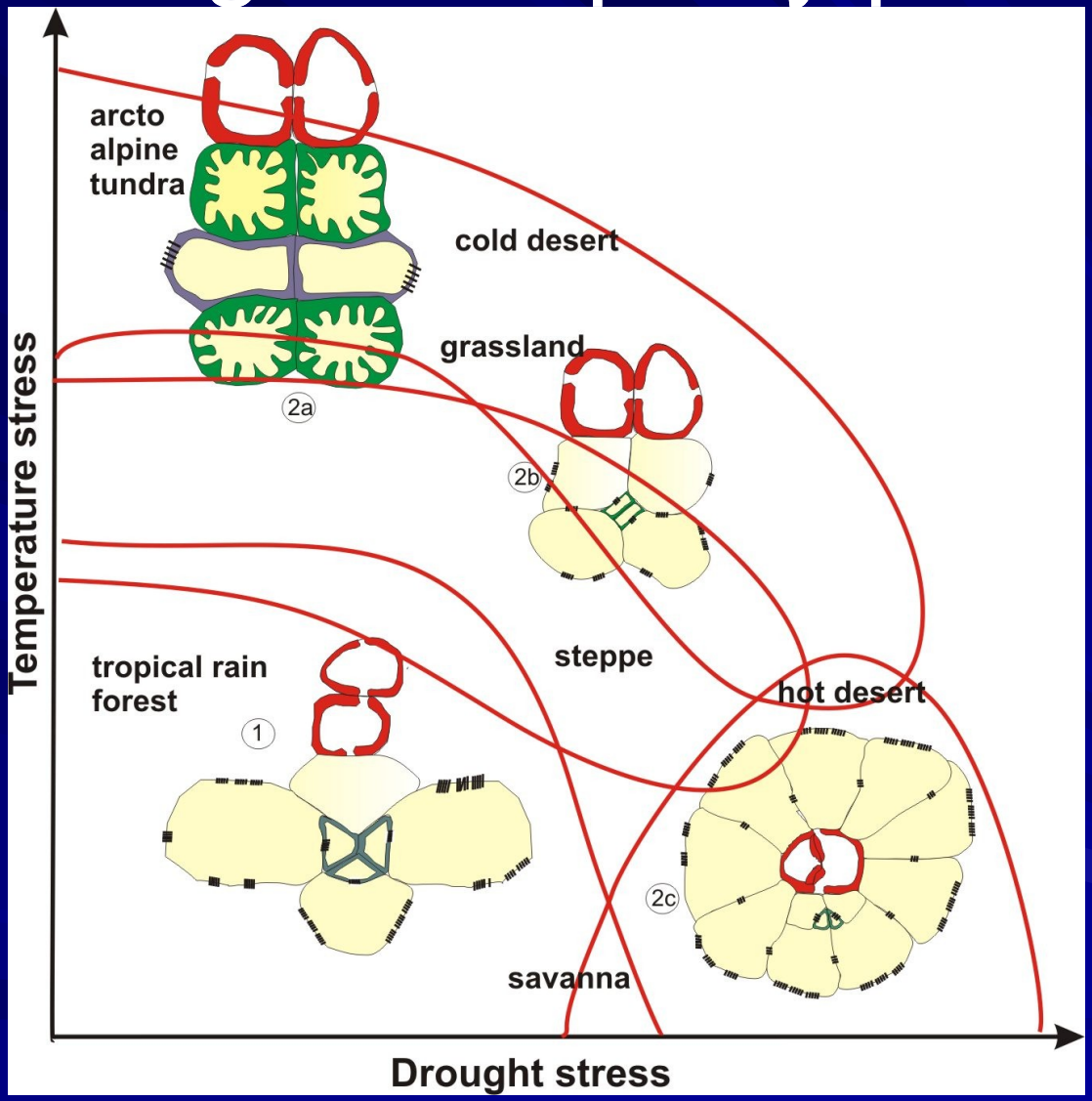
- Z disacharidů je u rostlin nejčastější **sacharóza**.
- Je tvořena molekulou glukózy a fruktózy. Nemá volnou aldehydickou ani ketonickou skupinu a je nejvýznamnjším **transportním cukrem**. Může být také ukládána ve vakuolách jako **sacharid zásobní**

http://kfrserver.natur.cuni.cz/lide/edmunz/praktika_fr/mb130p13/navody/2_fotosynteza.pdf

Plnění plnění lýka



Ekofyziologické aspekty plnění lýka



Typy plnění lýka

Definitions of phloem loading types			
TYPES	**PLASMODESMALAL ABUNDANCE**	**COMPANION CELL ULTRASTRUCTURE**	**LOADING METHOD**
1	Many plasmodesma at all cell interfaces between Mesophyll and cc-se complex	Intermediary cells	**symplasmic**
2a	Few plasmodesma	Companion cells may have extensive vesicular substructure	**apoplasmic**
2b	cc-se is apparently apoplasmically isolated	Companion cells modified with wall ingrowths (transfer cells)	**apoplasmic**
2c	High frequencies of plasmodesmata to bundle sheath, few internal of this and the cc-se may be isolated	Companion cells	**apoplasmic**

CC: companion cells, SE sieve elements

- Phloem Transport: Cellular Pathways and Molecular Trafficking
- Annual Review of Plant Biology
- Vol. 60: 207-221 (Volume publication date June 2009)
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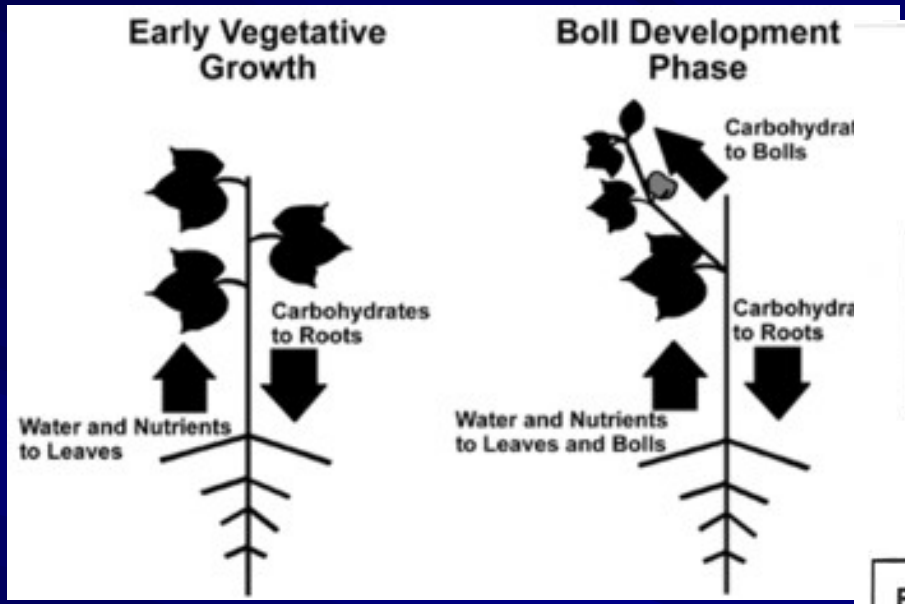
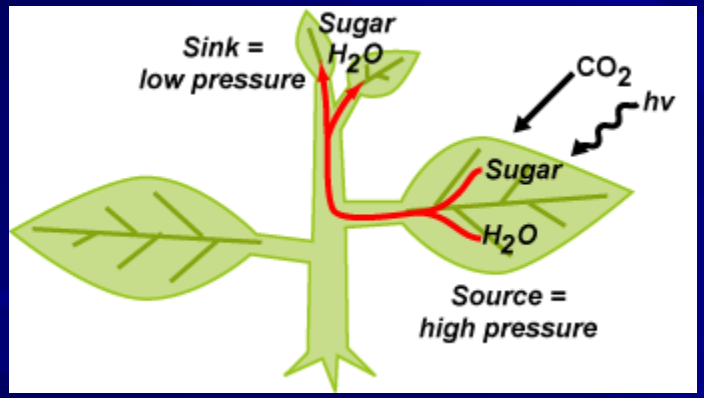
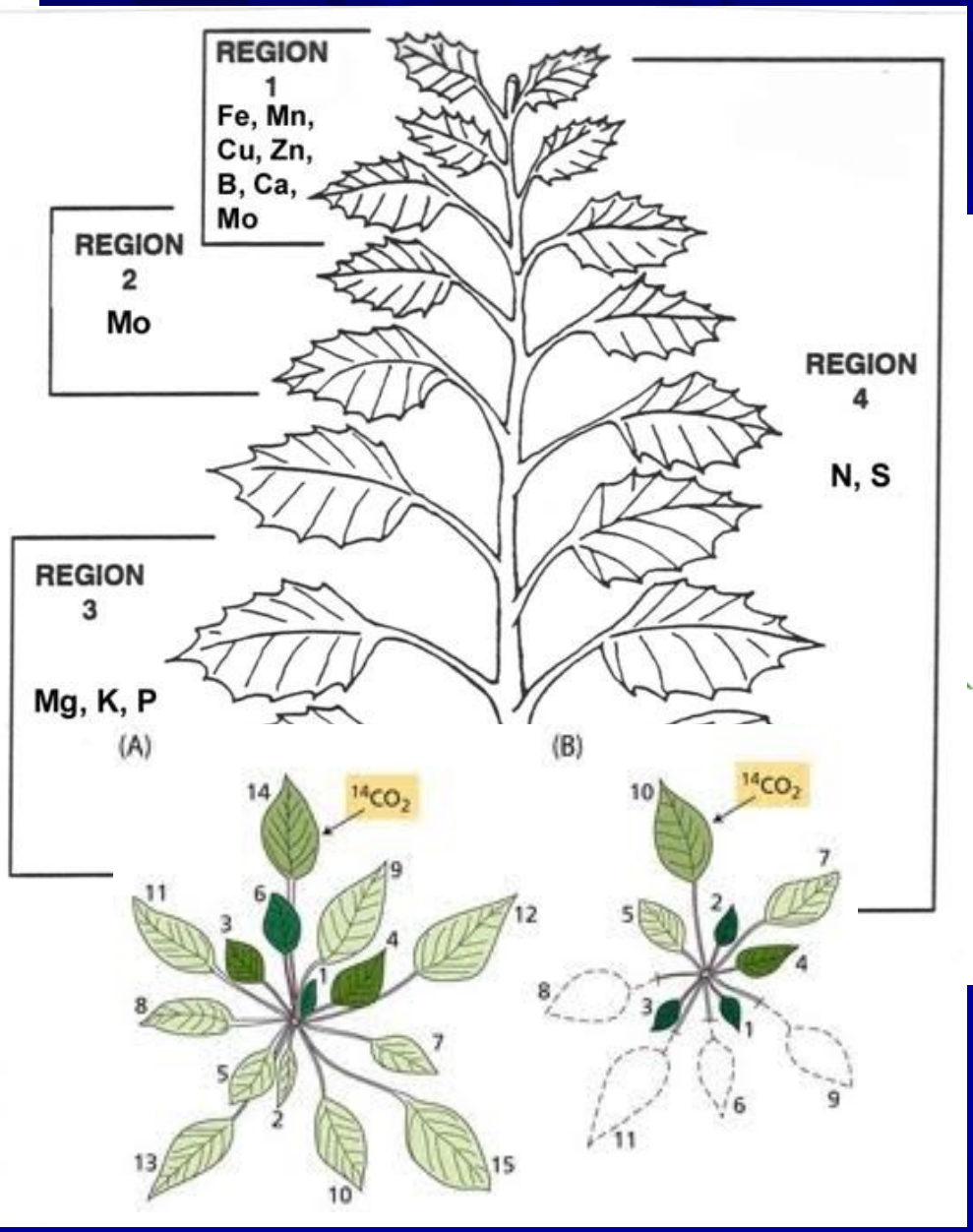
- **Robert Turgeon1 and Shmuel Wolf2**
- 1Department of Plant Biology, Cornell University, Ithaca, New York 14853; email: ert2@cornell.edu
- 2The Robert H. Smith Institute of Plant Sciences and Genetics in Agriculture and the Otto Warburg Minerva Center for Agricultural Biotechnology, The Hebrew University of Jerusalem, Faculty of Agricultural, Food and Environmental Quality Sciences, Rehovot 76100, Israel; email: swolf@agri.huji.ac.il

Source - Sink

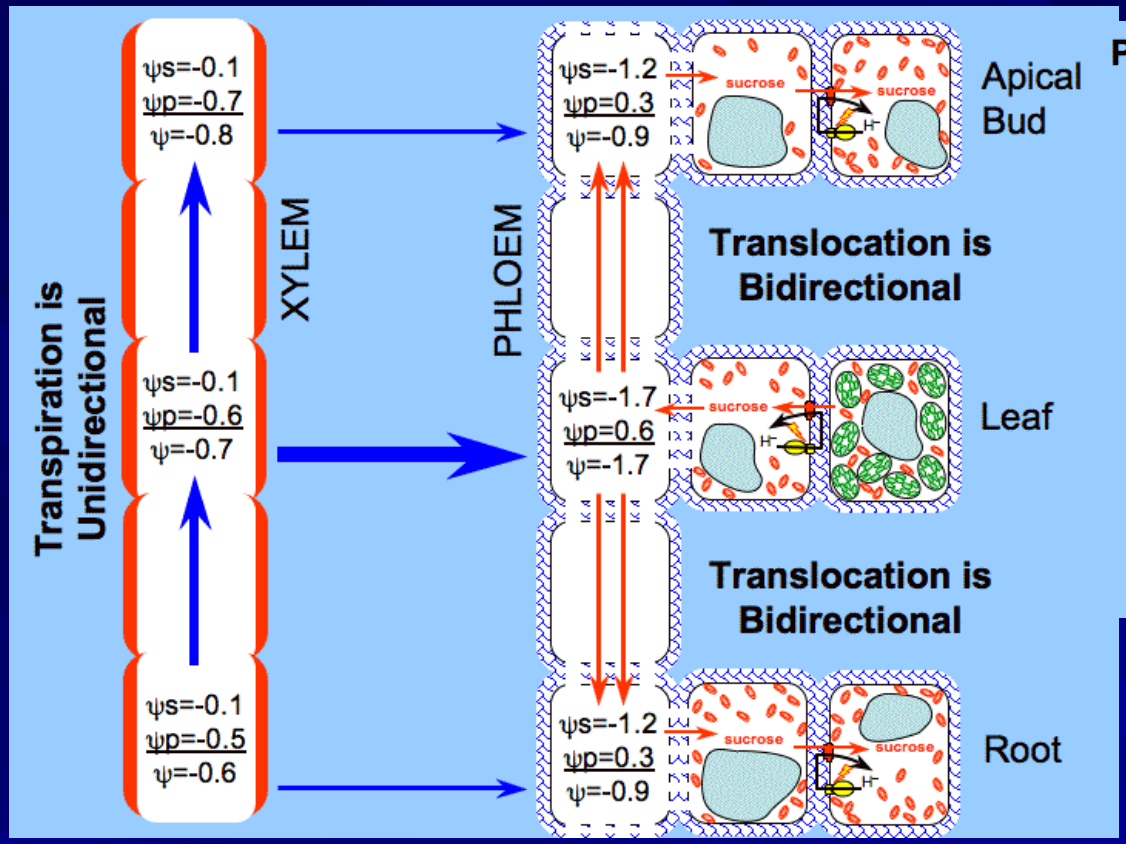




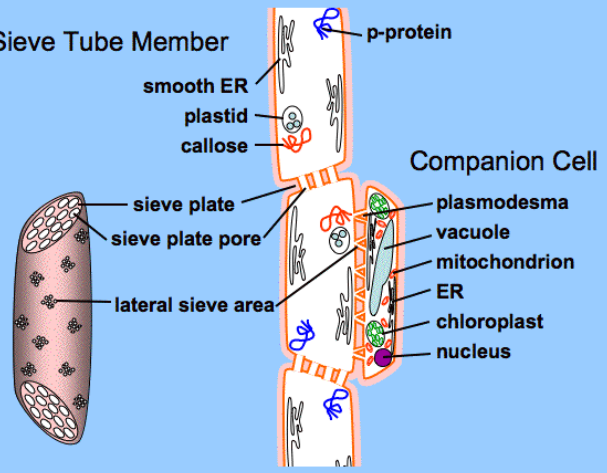


- http://www.extension.org/pages/10524/cotton-source-sink-
- 4e.plantphys.net
- http://www.biol.unt.edu/~bgayre/myweb/

Tok floémem, xylémem



Phloem Cell Interaction



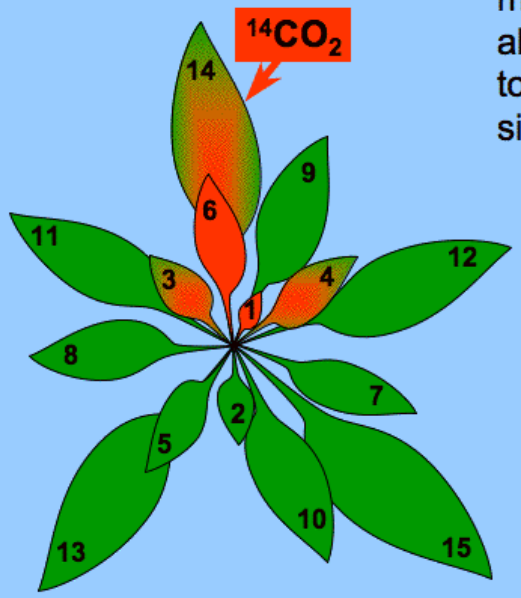
Phloem sap composition in castor bean plants

Component	Concentration (mg/mL)
Sugars	80-106
Amino Acids	5
Potassium	2-4
Organic Acids	2-3
Protein	1-2
Chloride	0.3-0.7
Phosphate	0.3-0.6
Magnesium	0.1

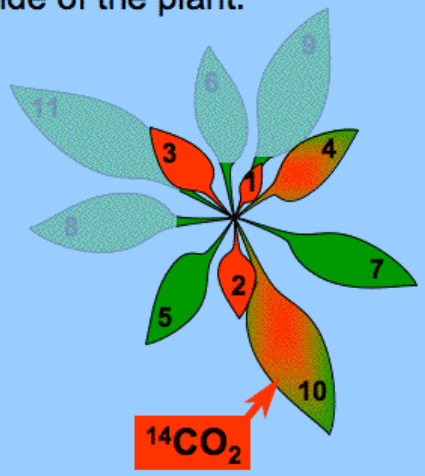
- http://plantphys.info/plant_physiology/translocation.shtml

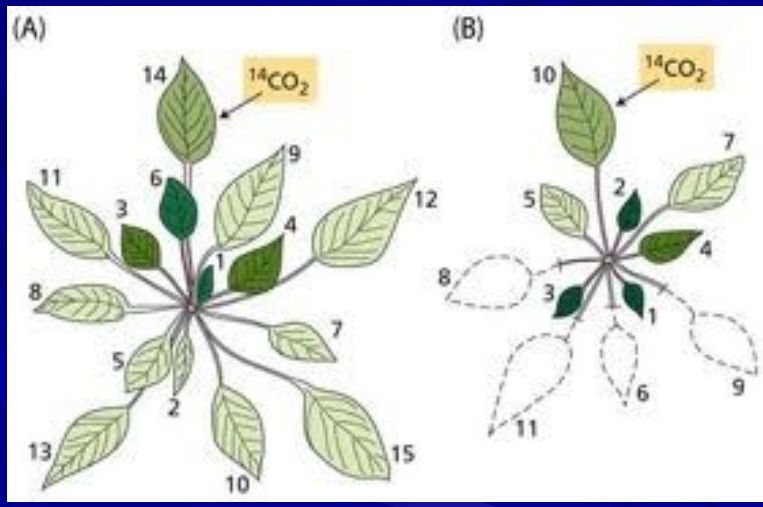
Source – sink

In an intact plant, photosynthate moves to younger leaves immediately above the source leaf.



When potential source leaves are removed, photosynthate moves to younger leaves above the source leaf but also to young leaves on the other side of the plant.





- http://plantphys.info/plant_physiology/translocation.shtml