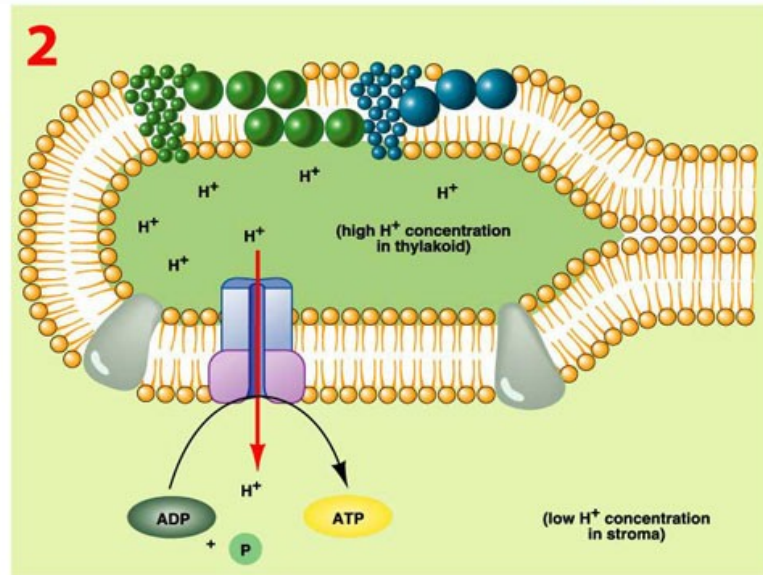
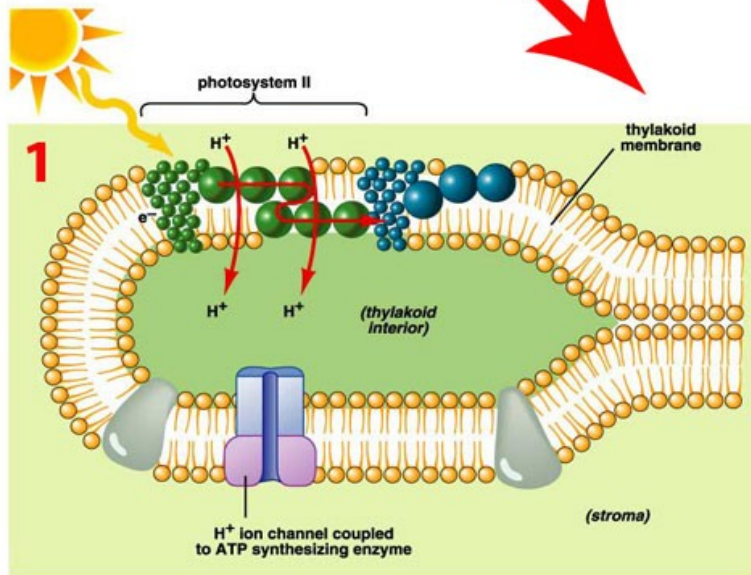
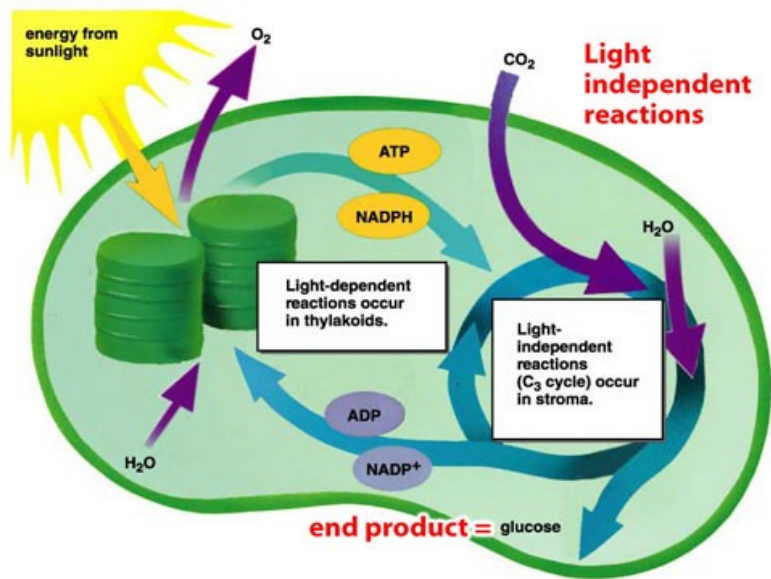
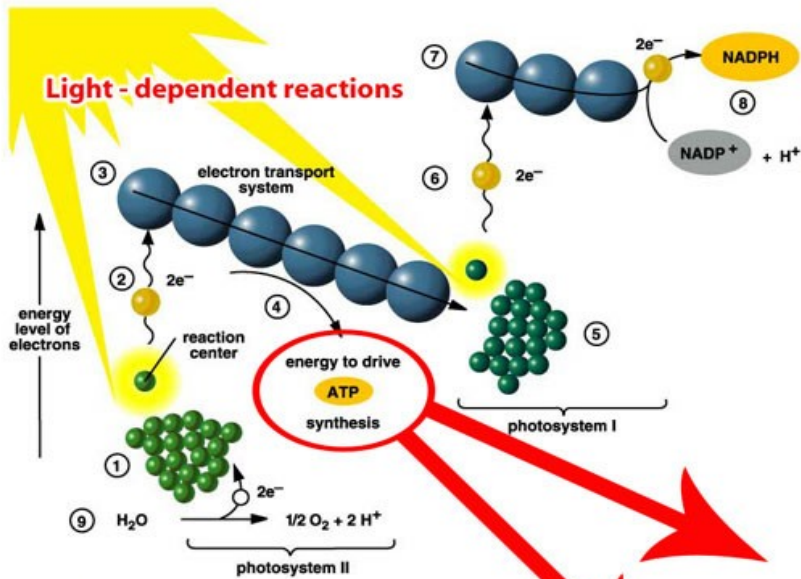


Produkční biologie rostlin
2014 podzim

Tvorba a transport asimilátů

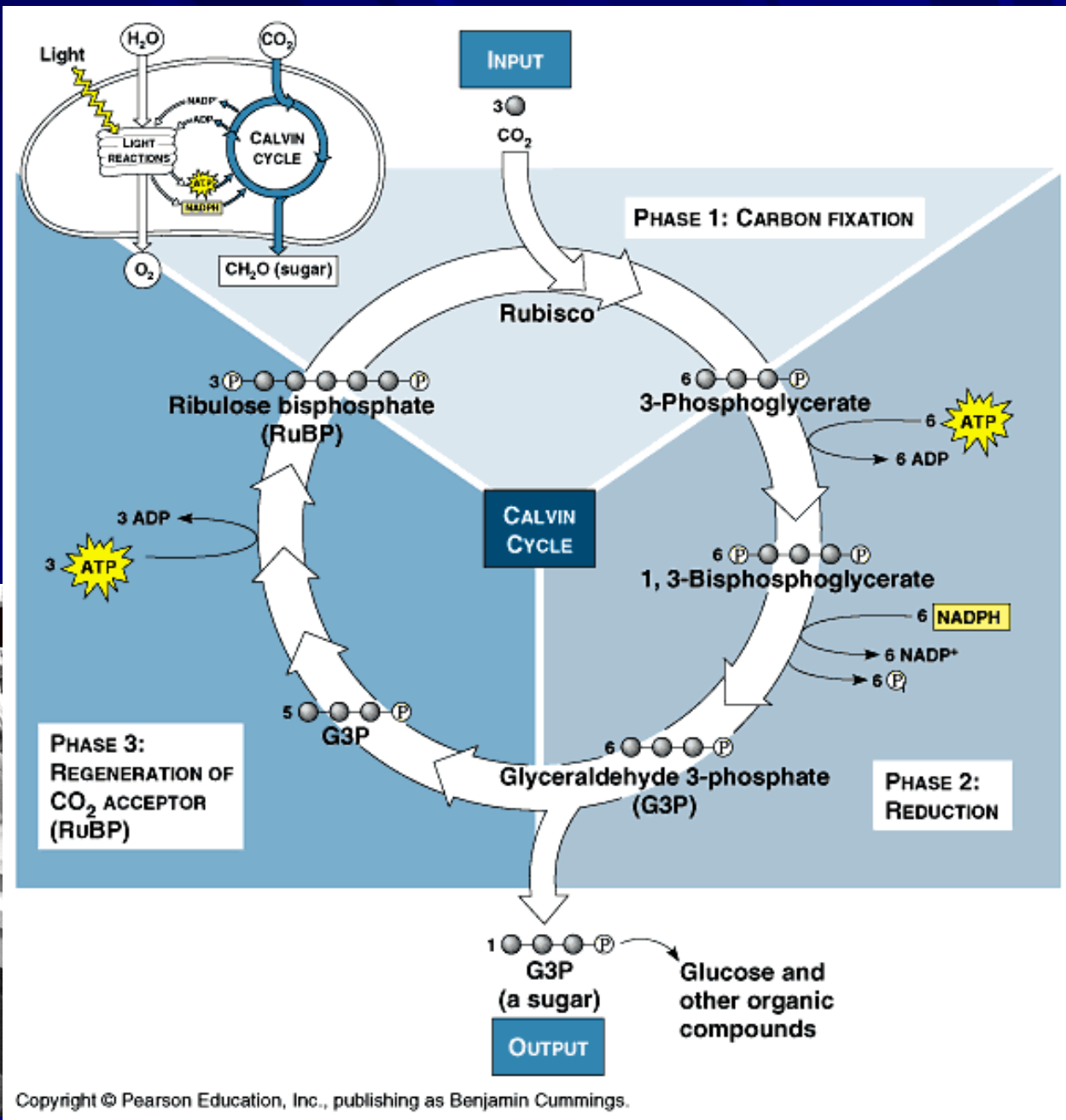
Miloš Barták

OFAR ÚEB PŘF MU Brno
Laboratoř fotosyntetických procesů



C3 fotosyntéza


Calvinův cyklus

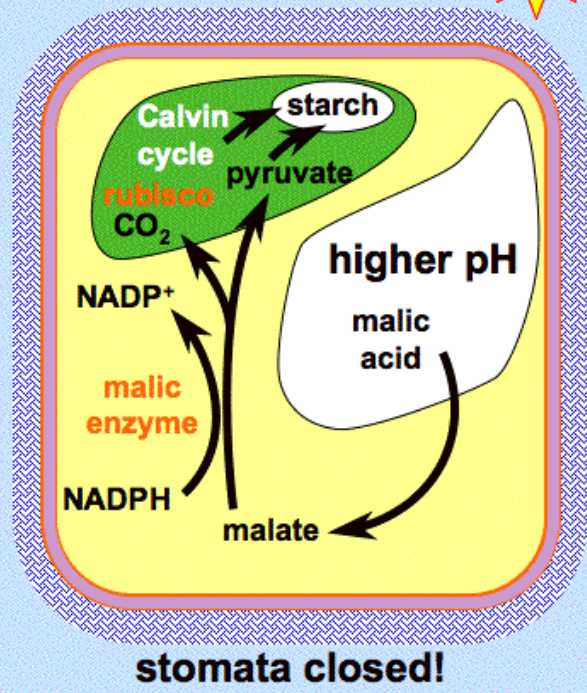
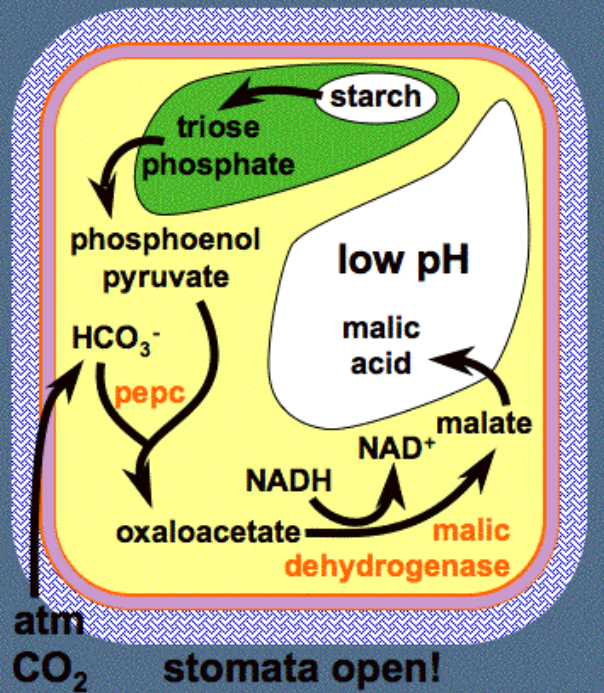


CAM Photosynthesis: Crassulacean Acid Metabolism

CAM

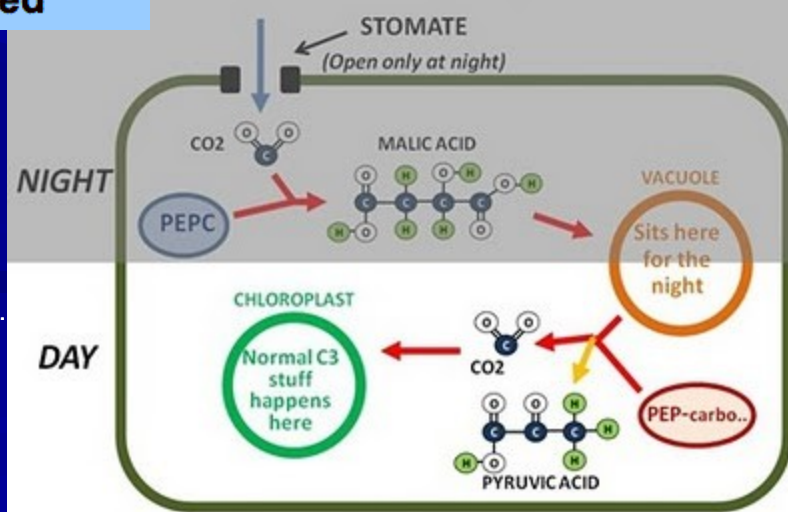
At Night

In Daylight 



The C₄ and C₃ reactions are **temporally** separated

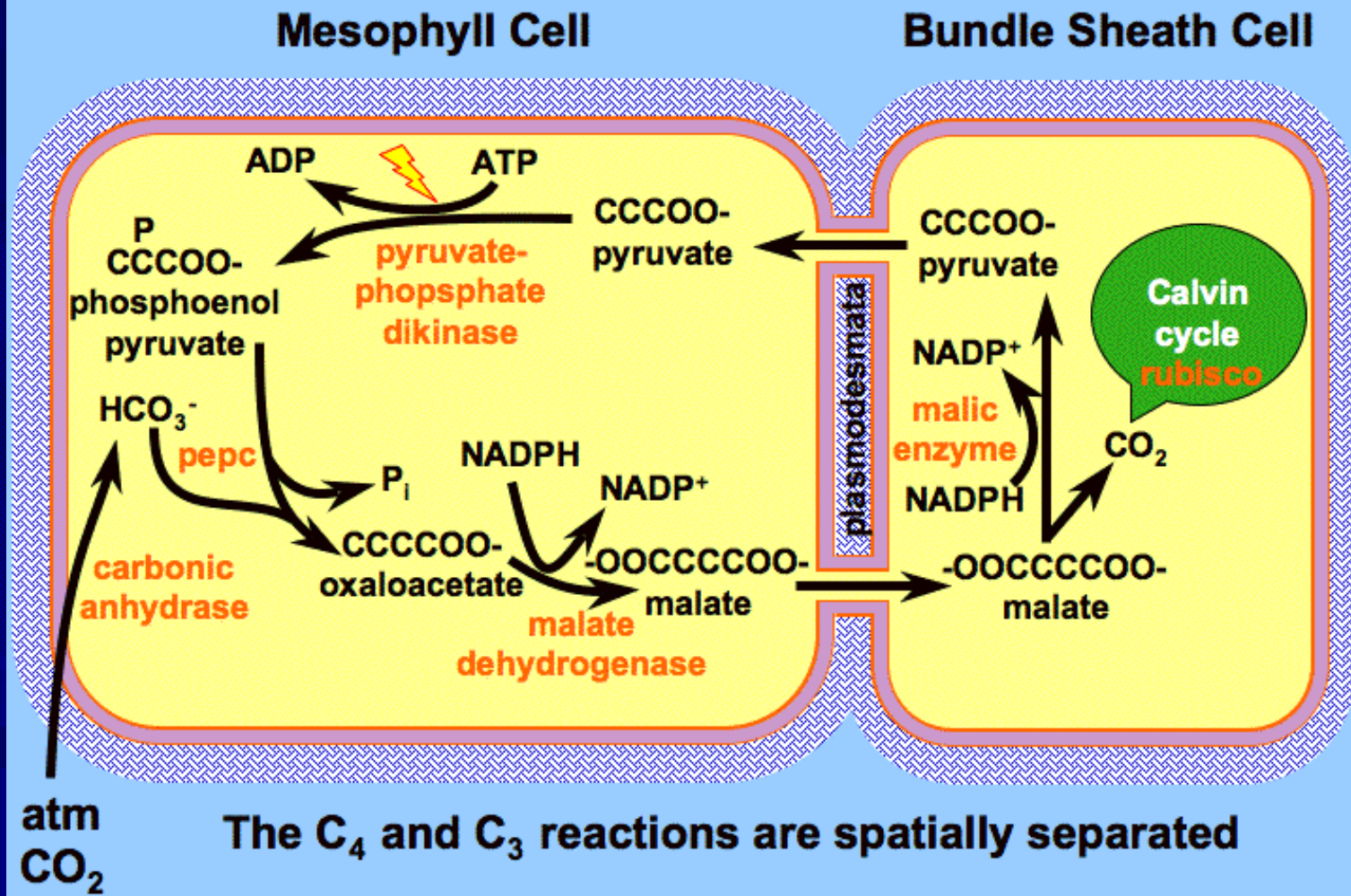
CAM Mesophyll Cell



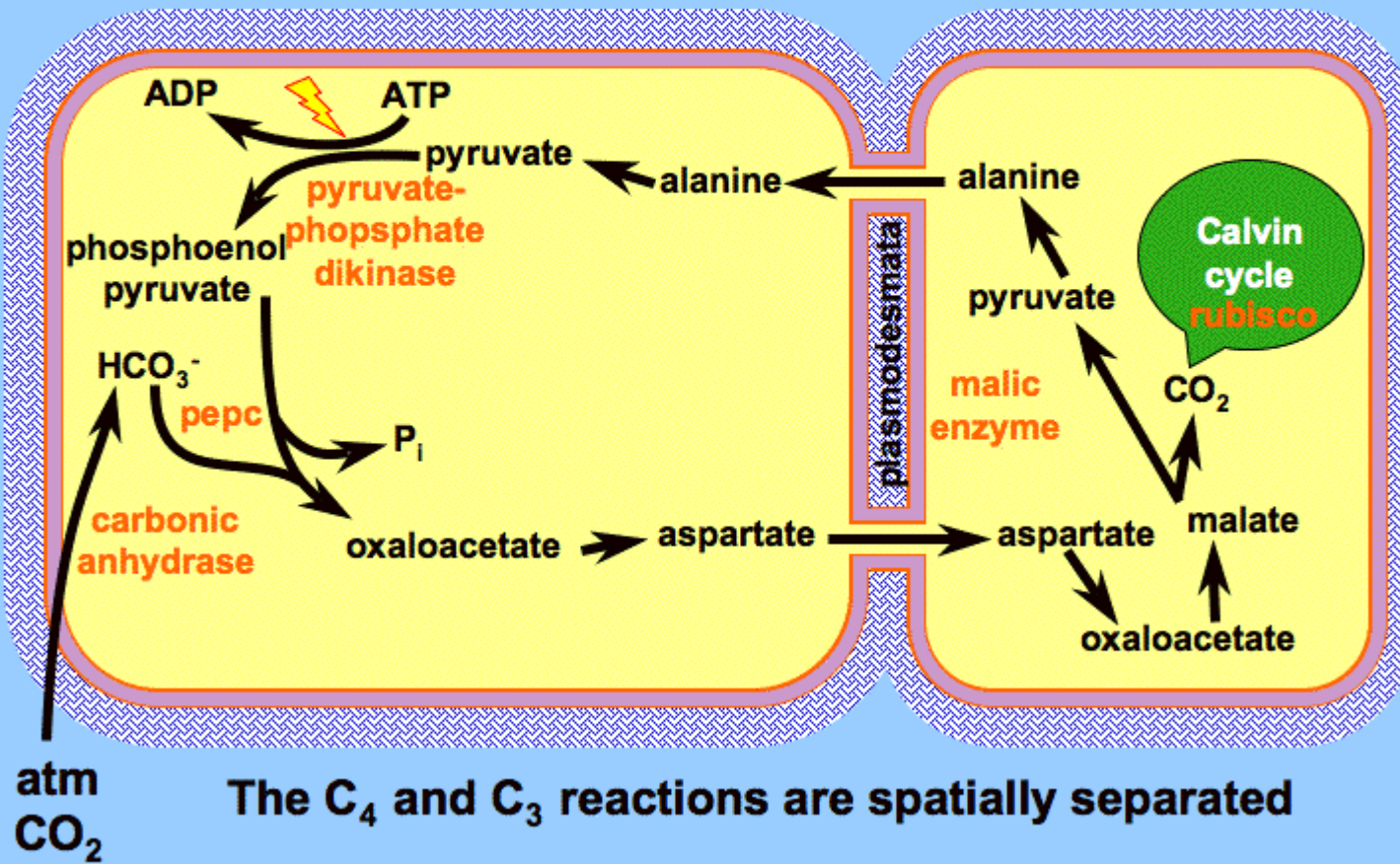
<http://silvana-v12.blogspot.com/2009/12/describe-process-of-photosynthesis-in->

C4

C₄ Photosynthesis: A cycle requiring ATP and NADPH



Alternative C₄ Photosynthesis: Evolved multiple times! NAD malic enzyme type



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

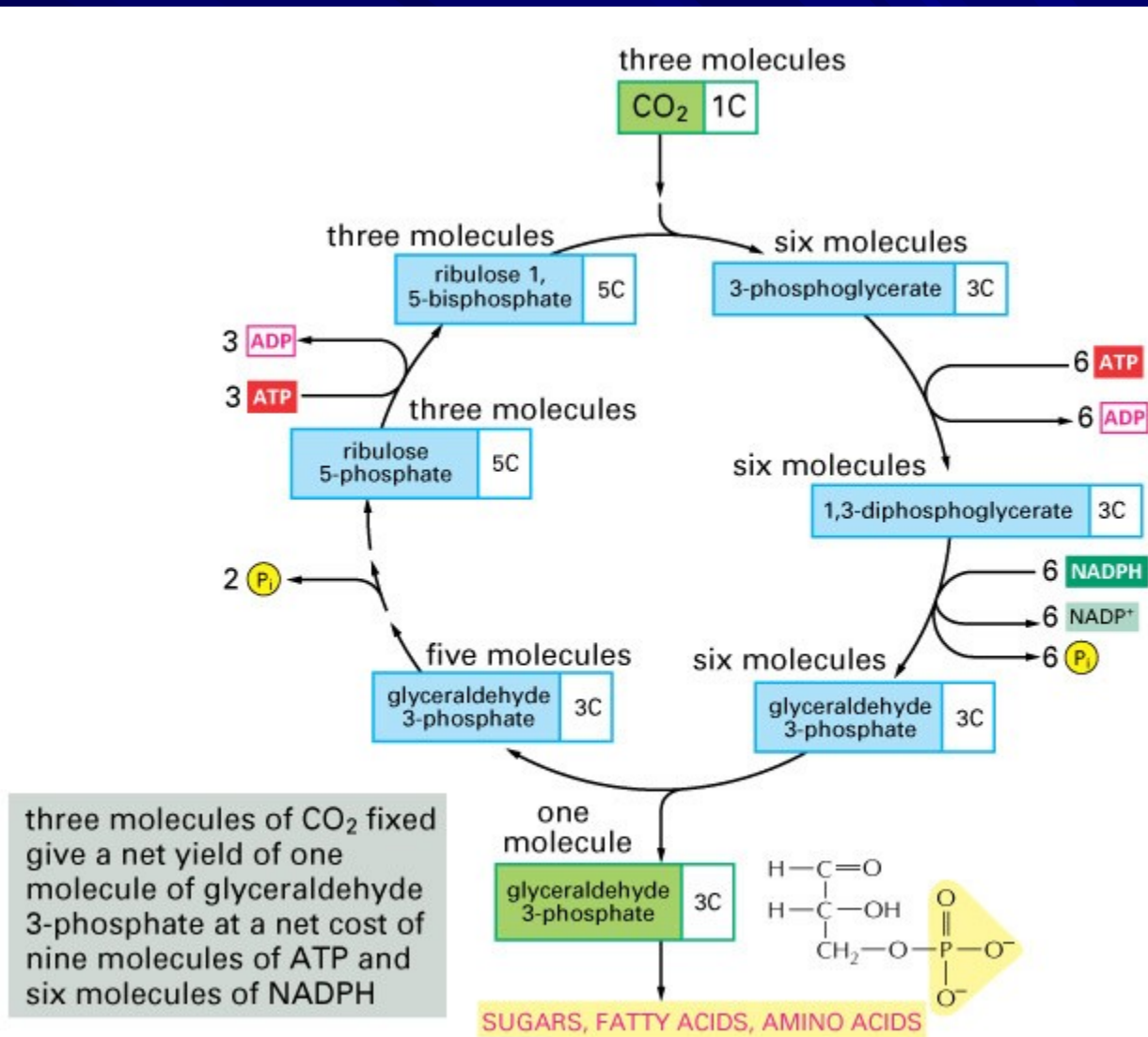
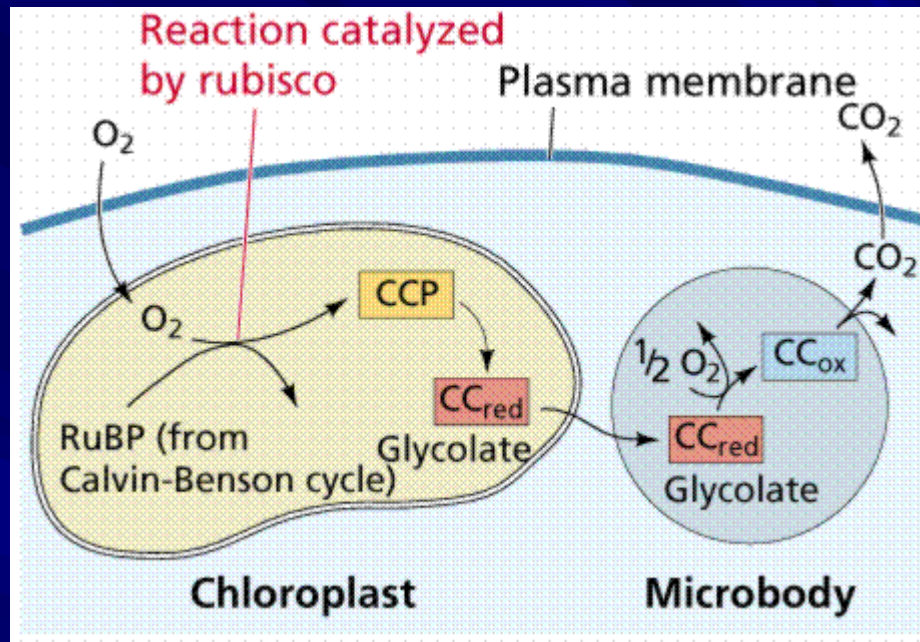


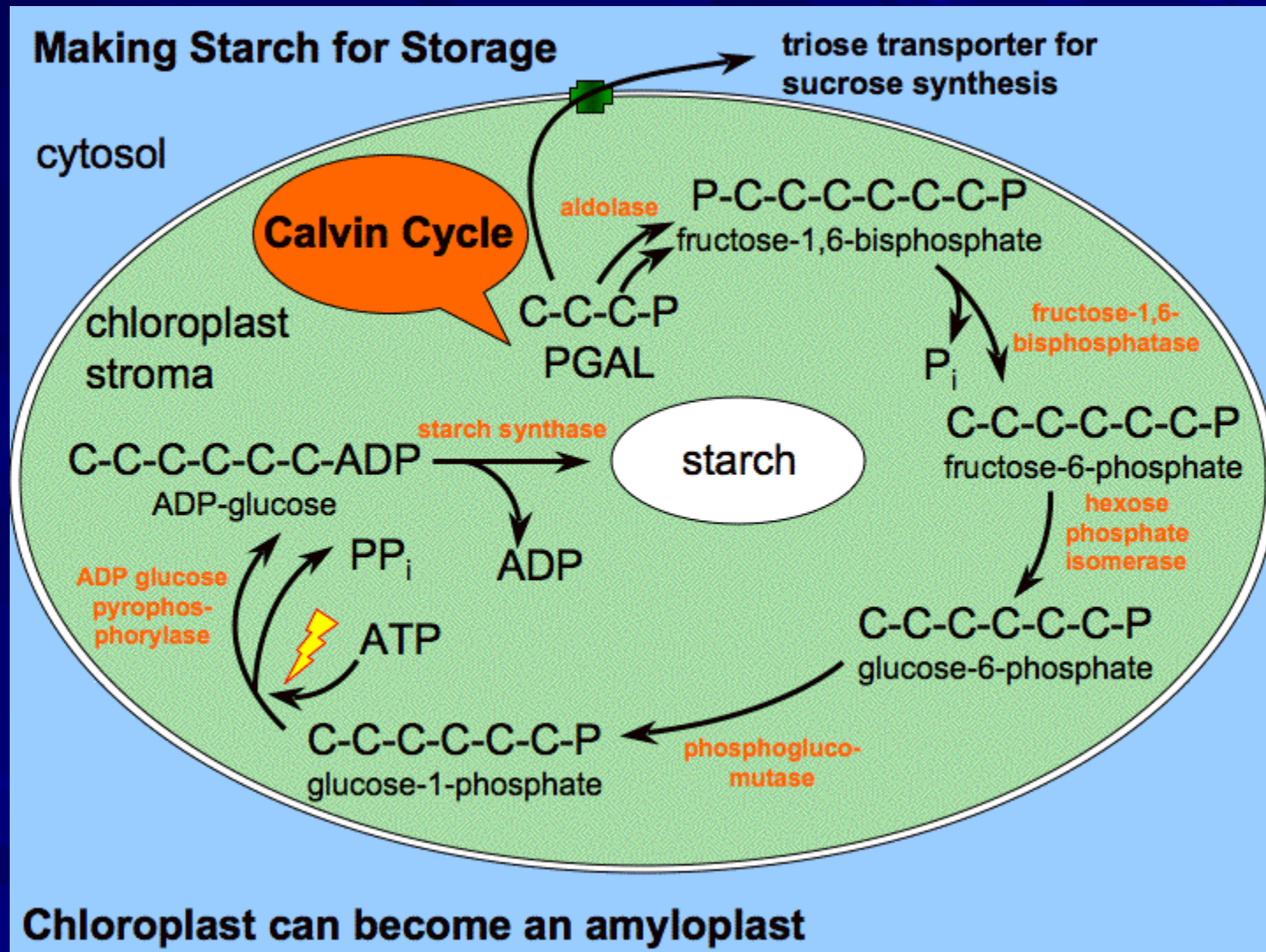
Figure 14-39 Essential Cell Biology, 2/e. (© 2004 Garland Science)

Fotorespirace

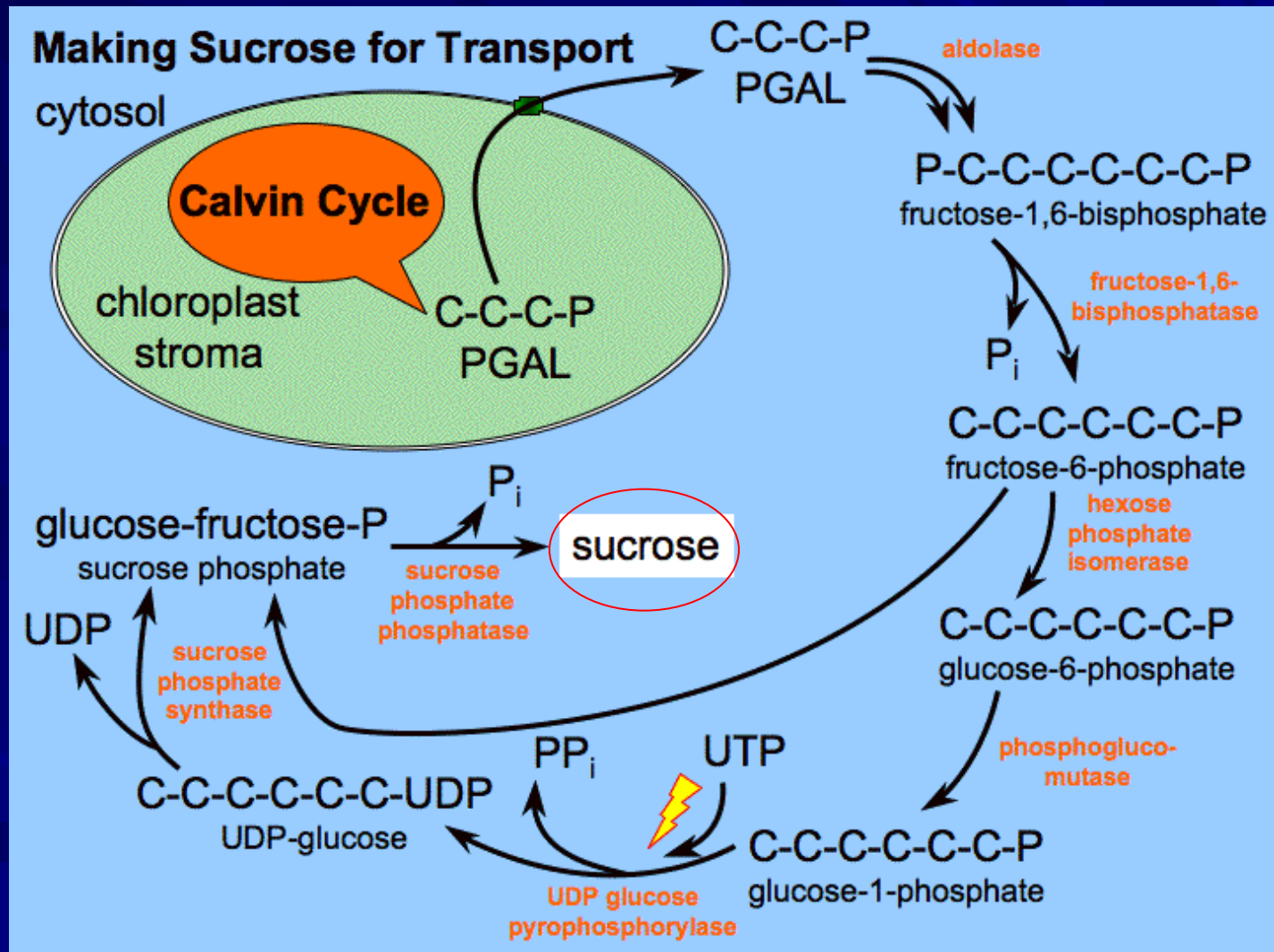


Fotorespirace nastává tehdy, je-li koncentrace CO_2 uvnitř listu nízká. To se děje v horkých suchých dnech, kdy je rostlina nucena uzavřít své průduchy, aby tím zabránila nadměrné ztrátě vody. Jestliže se list snaží fixovat CO_2 i když jsou zavřené průduchy, tedy dosáhne-li pokles koncentrace CO_2 uvnitř listu zhruba 50 ppm, Rubisco začne interagovat s O_2 , RuBP namísto CO_2 .

Tvorba asimilačního škrobu

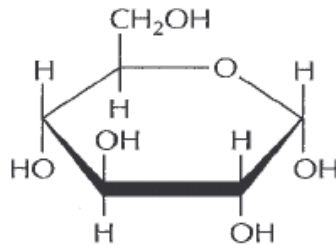
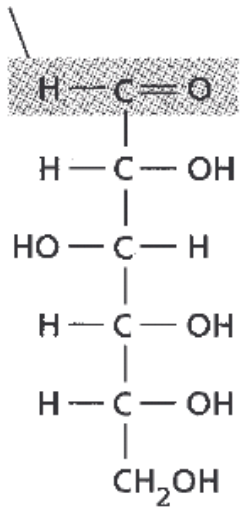


Tvorba transportních sacharidů



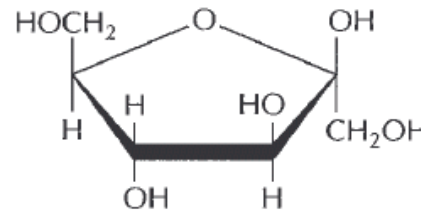
Sacharidy : produkty fotosyntézy

aldehydická skupina

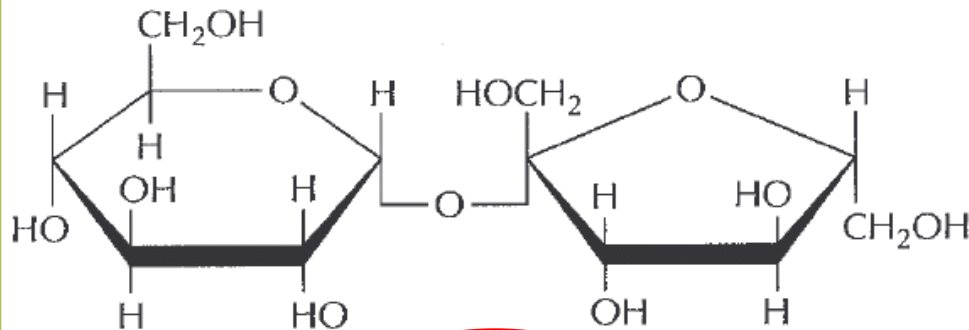
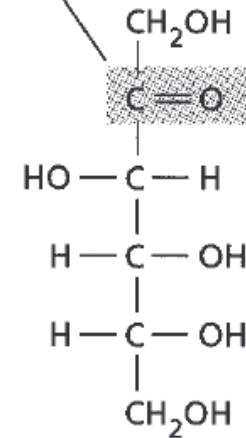


glukóza

ketonická skupina



fruktóza



sacharóza

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.

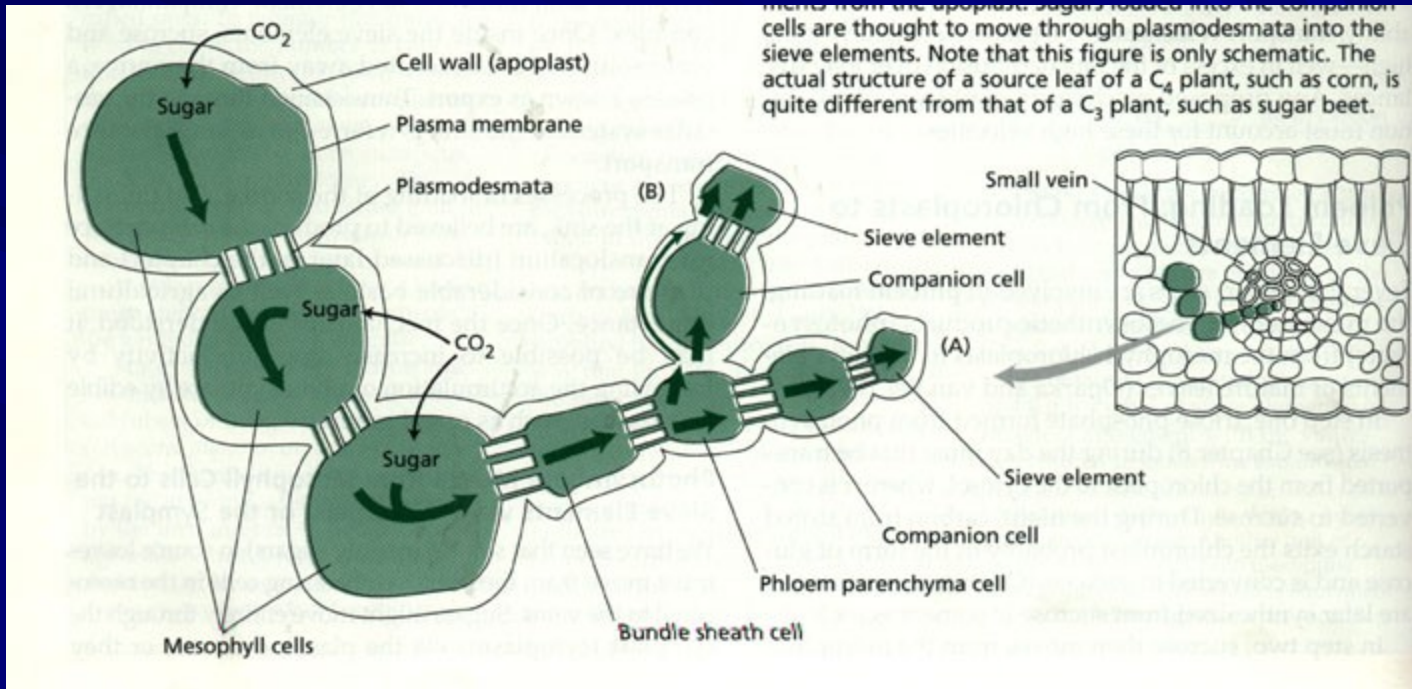
Nejčastější hexózy jsou u rostlin - **glukóza** s aldehydickou skupinou

a **fruktóza** se skupinou ketonickou.

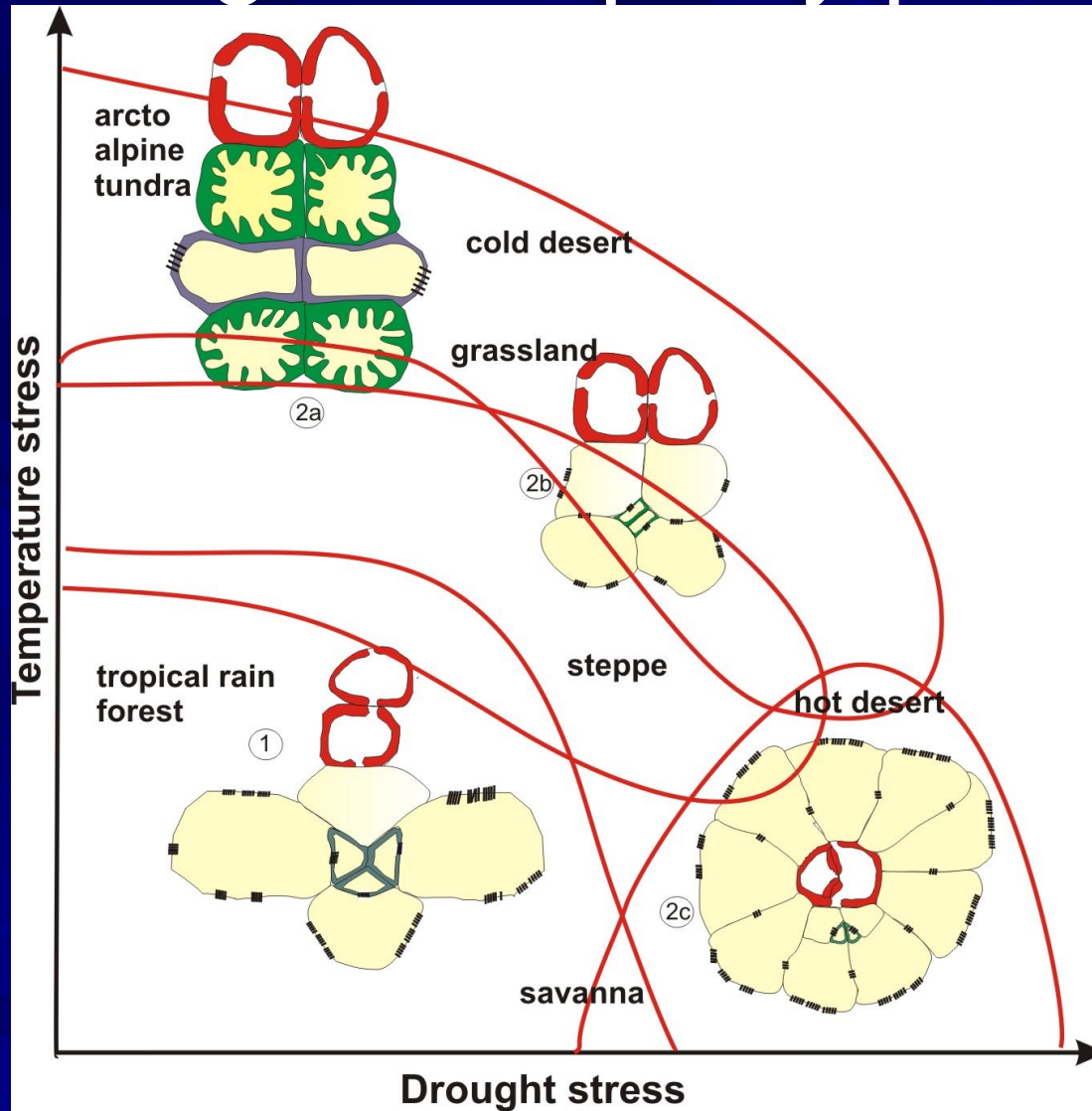
Disacharidy

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

Plnění plnění lýka



Ekofyziologické aspekty plnění lýka



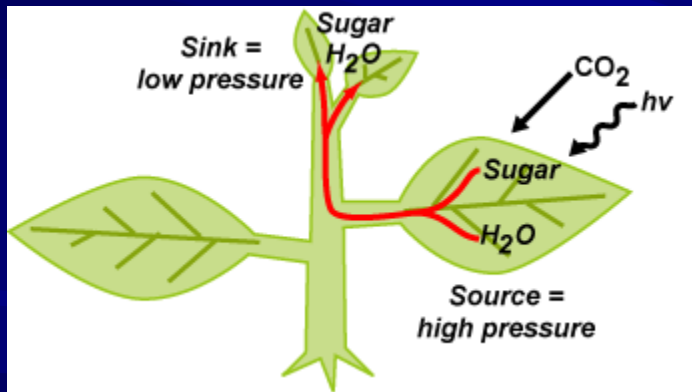
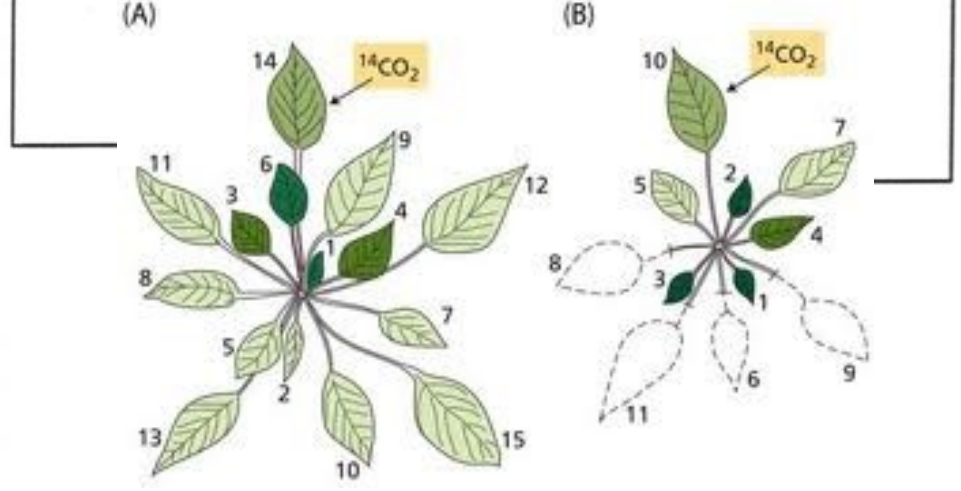
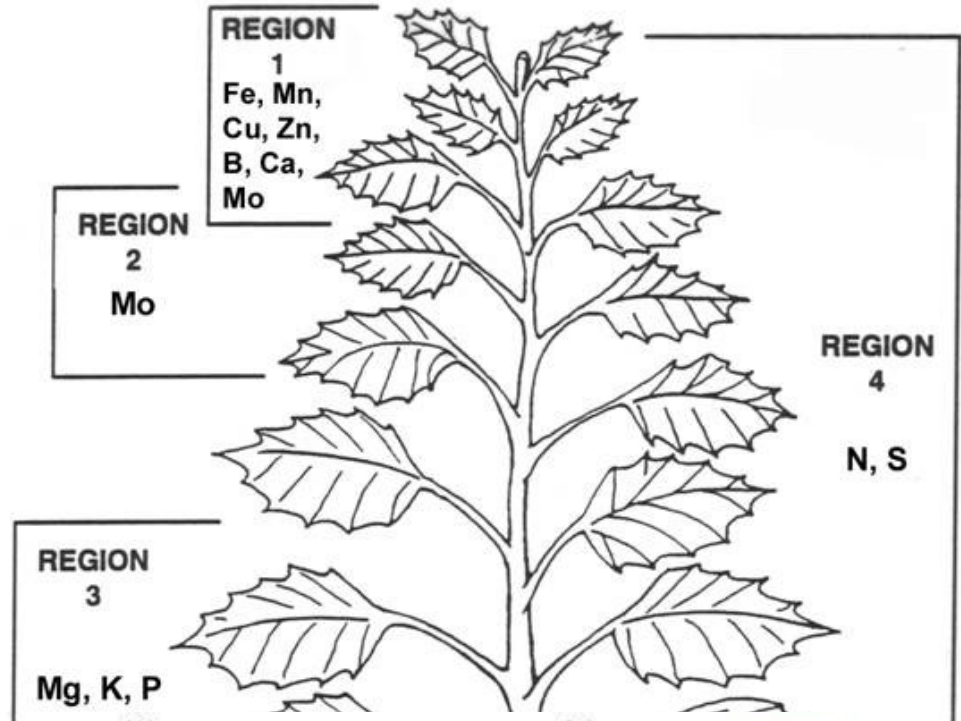
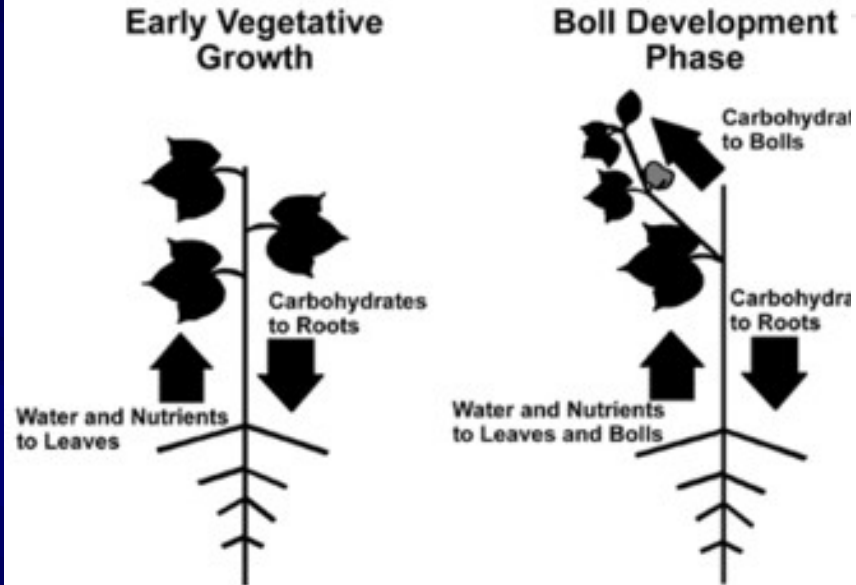
Typy plnění lýka

Definitions of phloem loading types			
TYPES	PLASMODESMAL 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

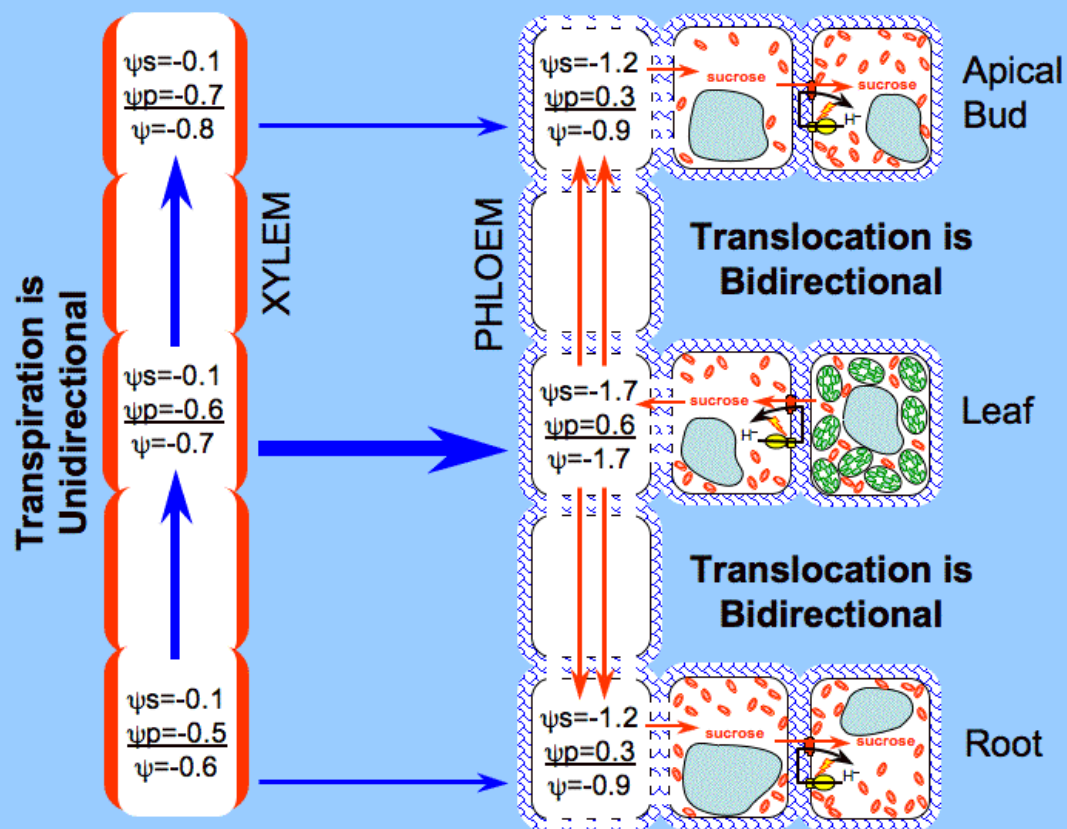
- Phloem Transport: Cellular Pathways and Molecular Trafficking
- Annual Review of Plant Biology
- Vol. 60: 207-221 (Volume publication date June 2009)
- First published online as a Review in Advance on November 21, 2008
- DOI: 10.1146/annurev.arplant.043008.092045
- **Robert Turgeon¹ and Shmuel Wolf²**
- 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

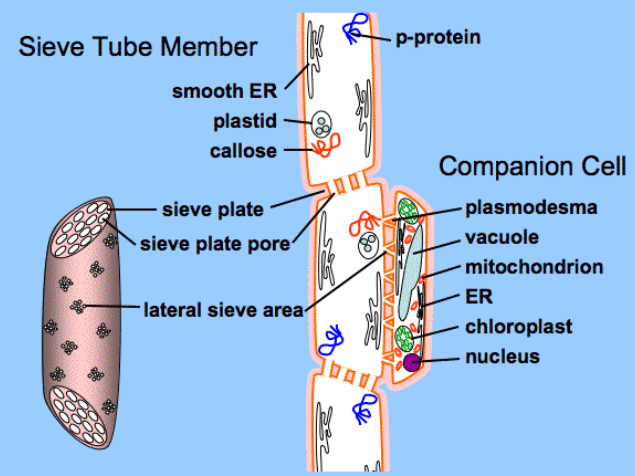


- <http://www.extension.org/pages/10524/cotton-source-sink>
- 4e.plantphys.net
- <http://www.biol.unt.edu/~bgayre/myweb/>

Tok floémem, xylémem



Phloem Cell Interaction

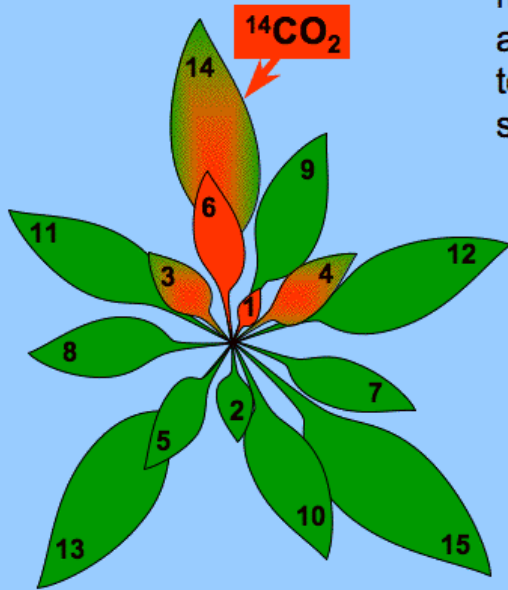


Phloem sap composition in castor bean plants

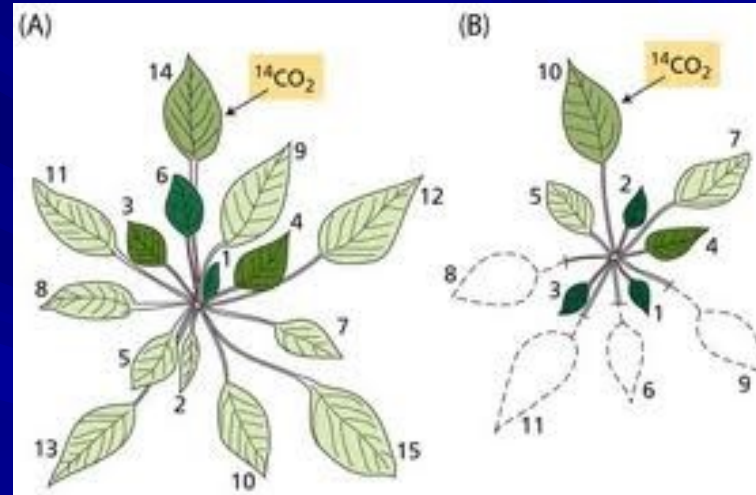
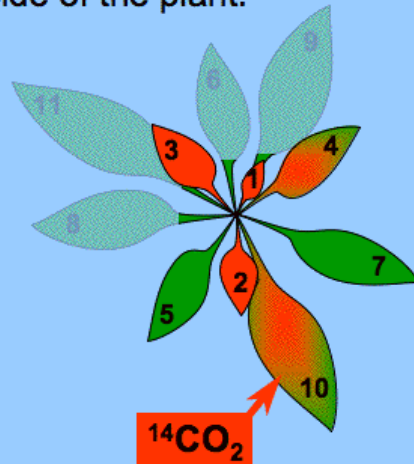
Component	Concentration (mg/mL)
Sugars	80-106
Amino Acids	5
Potassium	2-4
Organic Acids	2-3
Protein	1-2
Chloride	0.3-0.7
Phosphate	0.3-0.6
Magnesium	0.1

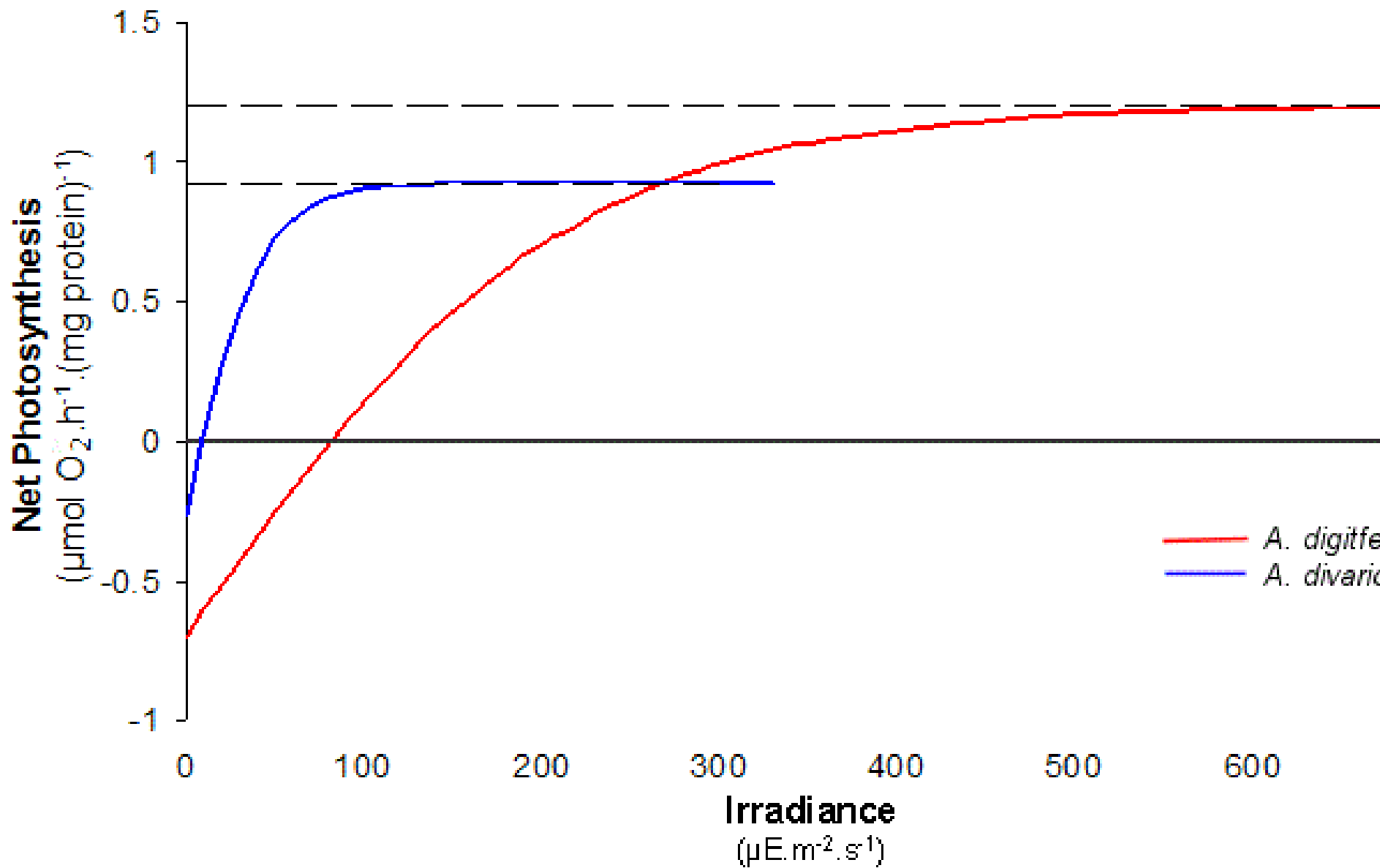
Source – sink

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

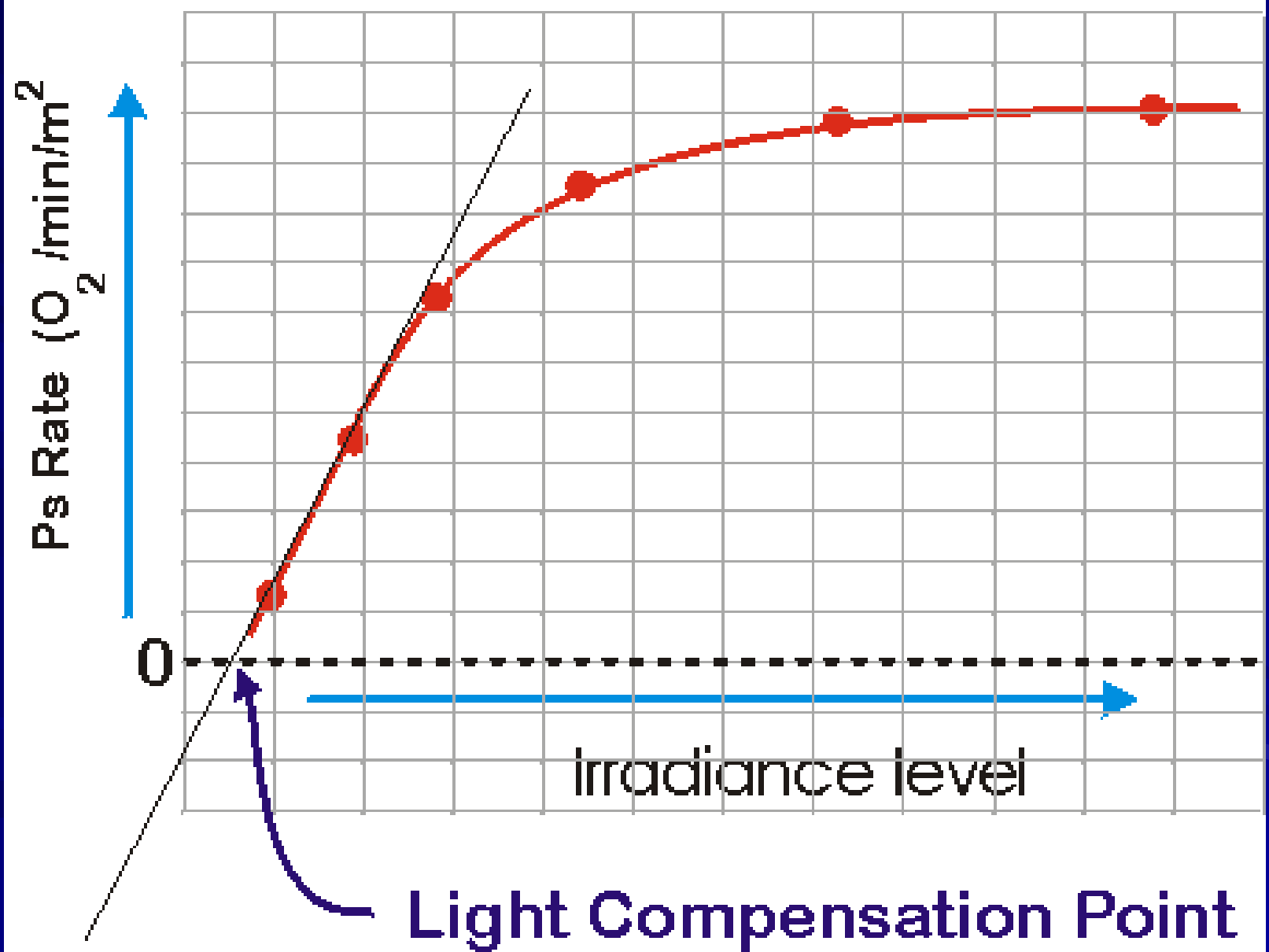


When potential source leaves are removed, photosynthate moves to younger leaves above the source leaf but also to young leaves on the other side of the plant.





Photosynthesis light response curve



C3 vs C4 Photosynthesis

