

RELAÇÕES HÍDRICAS NAS PLANTAS

12 DE MARÇO DE 2018

(6ª aula do bloco)

Sumário da Aula Anterior:

A cavitação. A teoria da Coesão - Tensão. A transpiração.

Programa Para a Aula de Hoje:

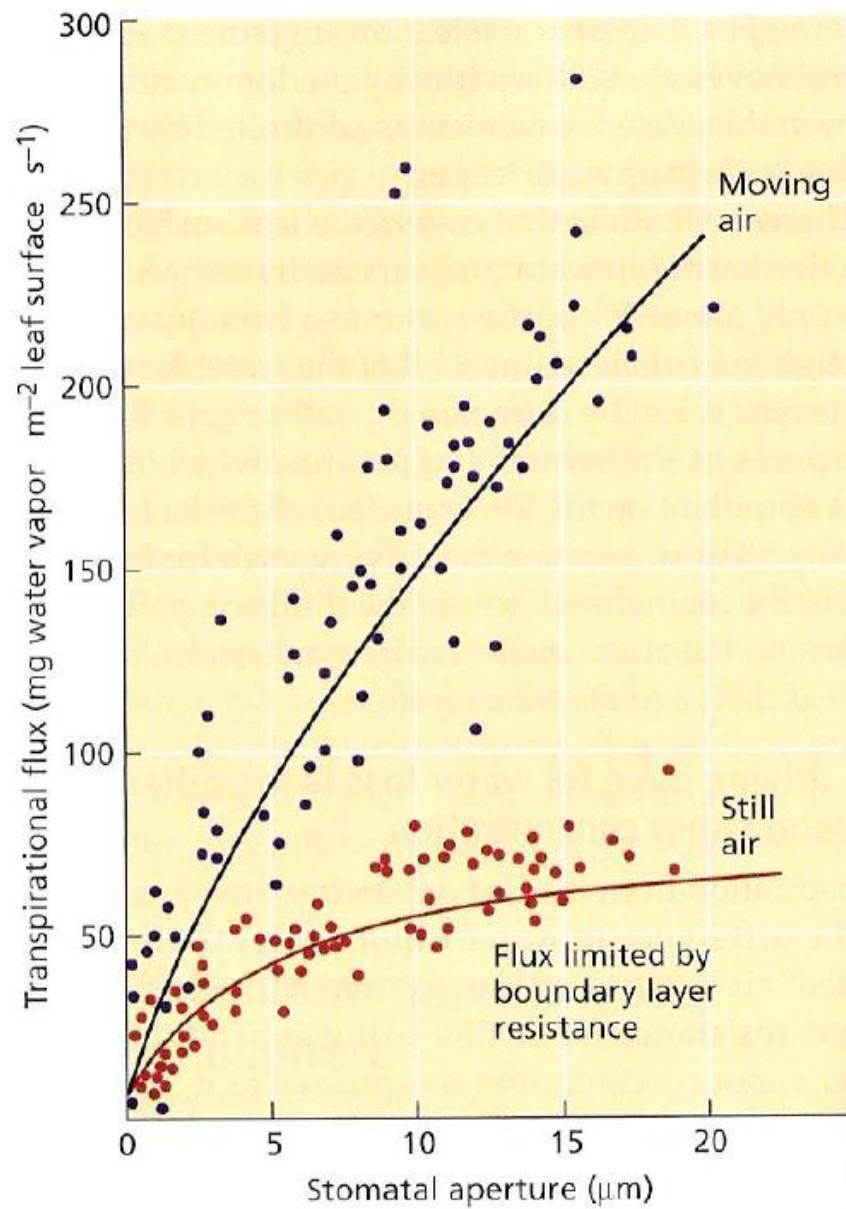
Influência da “boundary layer” na transpiração. Constituição do aparelho estomático. Mecanismo de abertura estomática. Regulação estomática pela luz azul.

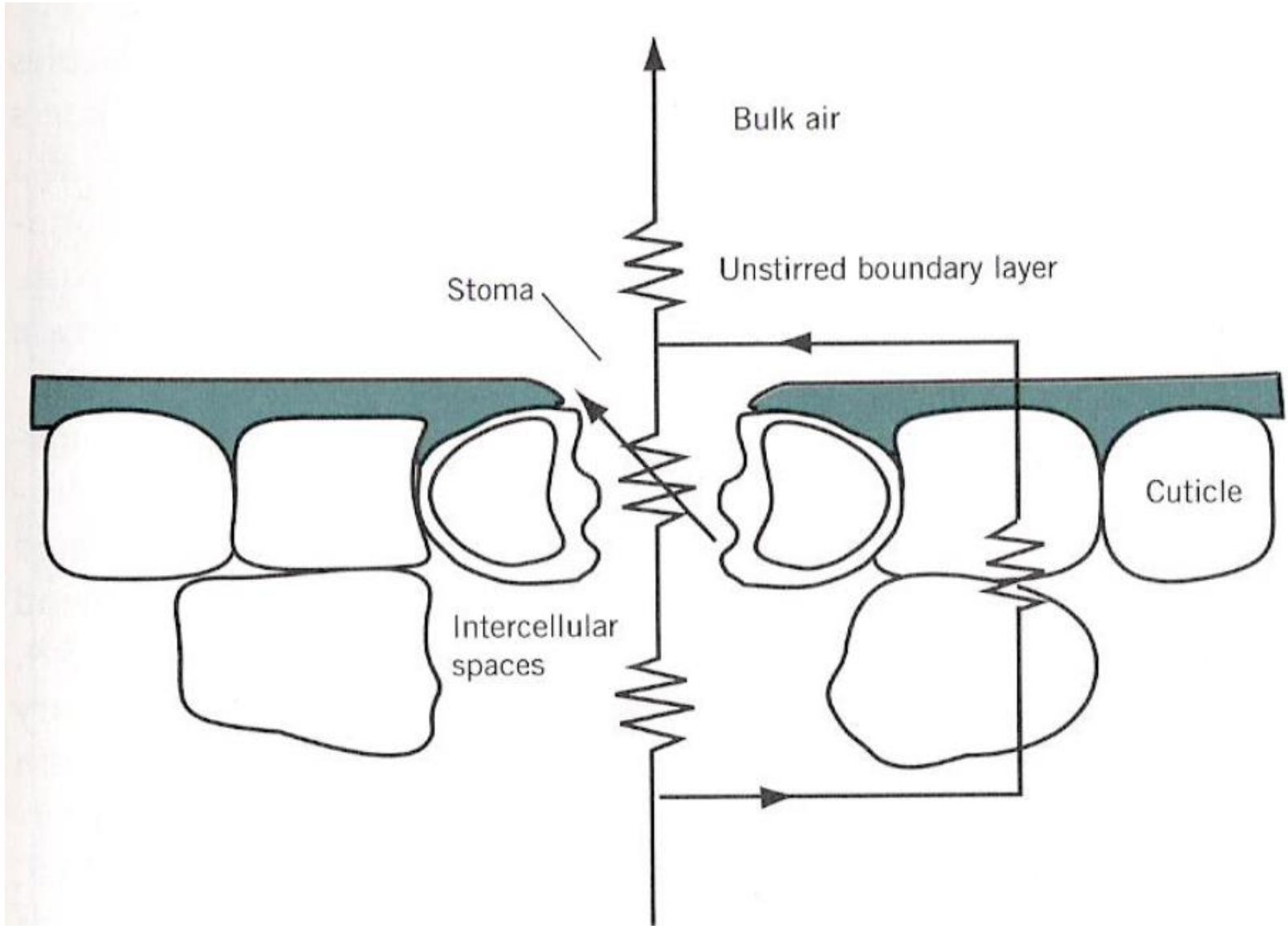
TABLE 3.2 Some values for water potential (Ψ) as a function of relative humidity (RH) at 20 °C.

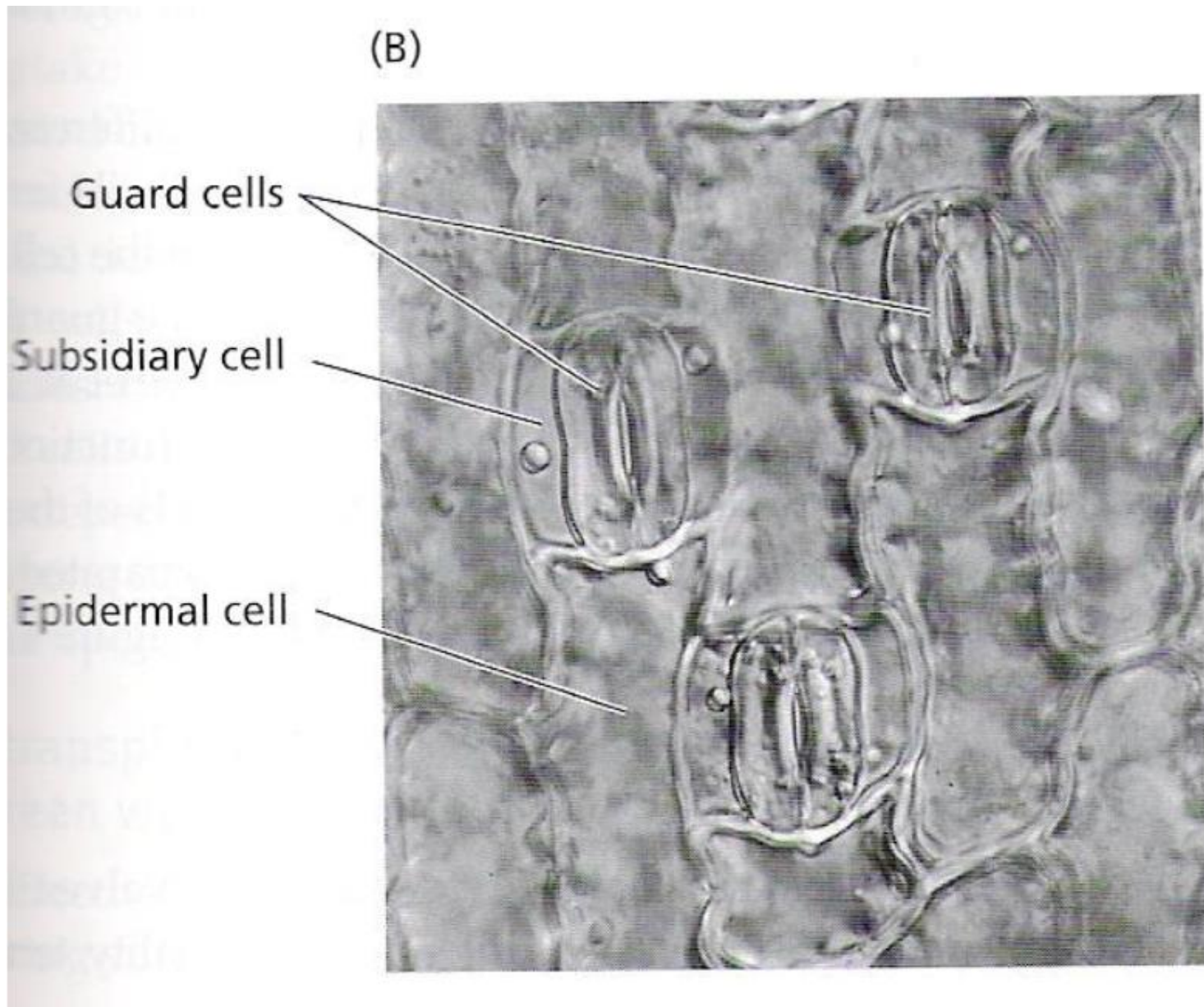
RH(%)	Ψ (MPa)*
100	0
95	-6.9
90	-14.2
50	-93.5
20	-217.1

TABLE 3.3 The effect of temperature and relative humidity on leaf-to-air vapor pressure gradient. In this example it is assumed that the water content of the atmosphere remains constant.

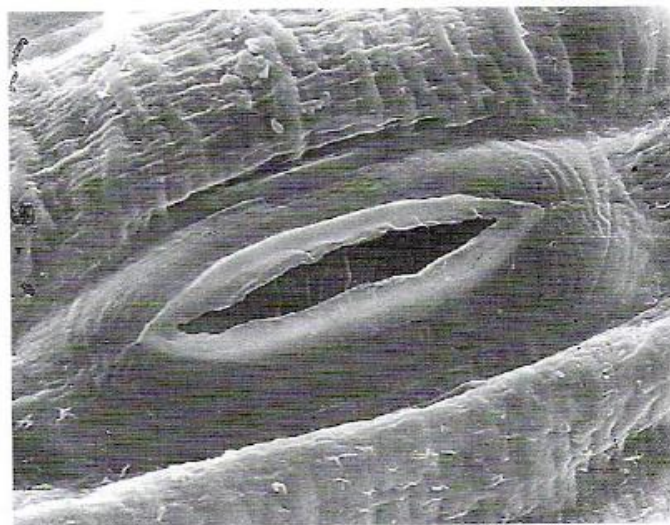
Leaf	Atmosphere	$e_{\text{leaf}} - e_{\text{air}}$
(A)		
T = 10 °C	T = 10 °C	
e = 1.23 kPa	e = 0.61 kPa	0.61 kPa
RH = 100%	RH = 50%	
(B)		
T = 20 °C	T = 20 °C	
e = 2.34 kPa	e = 0.61 kPa	1.73 kPa
RH = 100%	RH = 26%	
(C)		
T = 30 °C	T = 20 °C	
e = 4.24 kPa	e = 0.61	3.63 kPa
RH = 100%	RH = 26%	







(c)



Stomatal pore

Guard cell

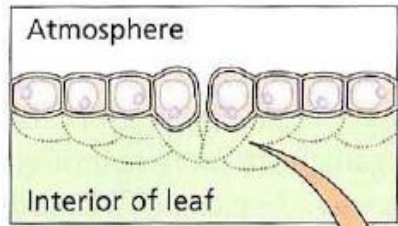
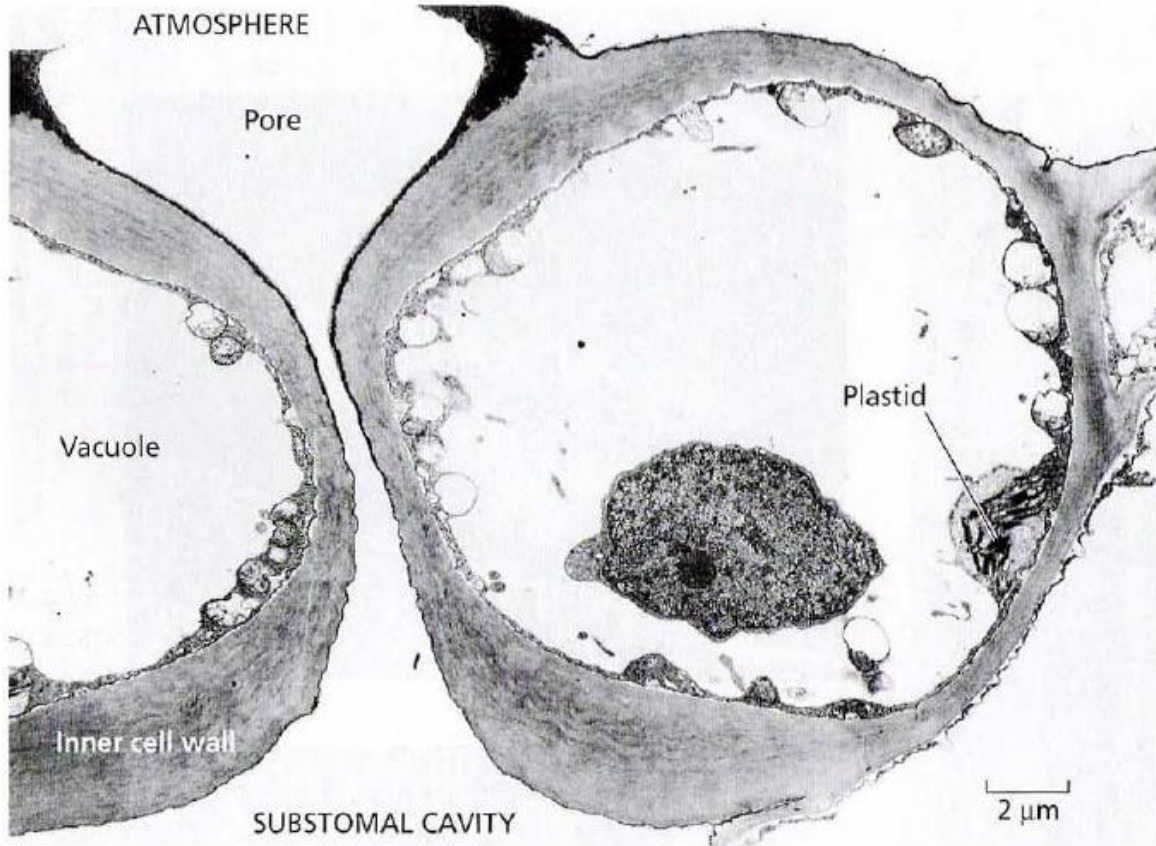
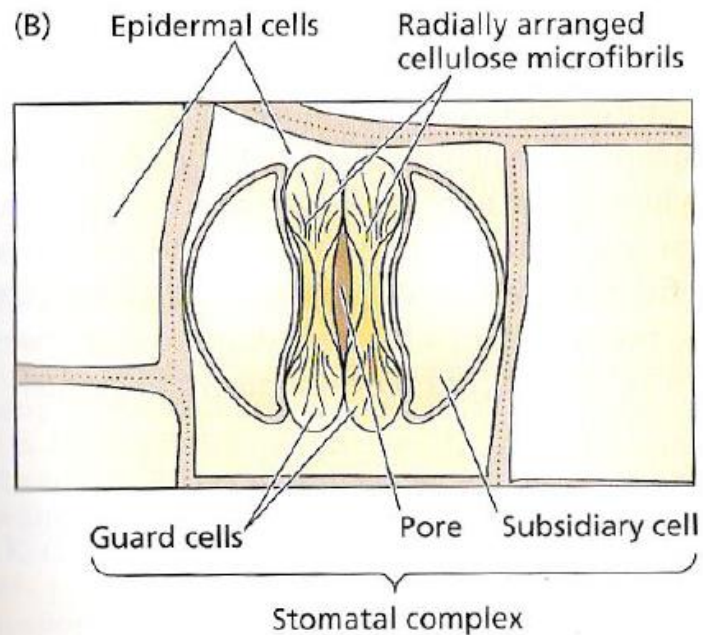
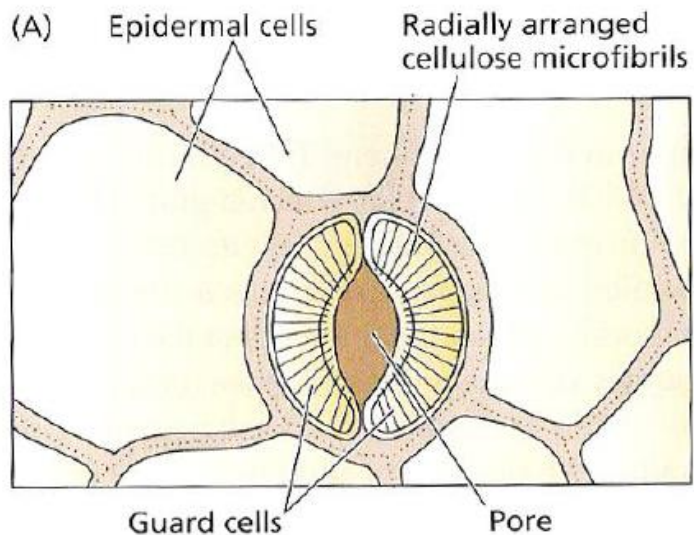


FIGURE 4.15 Electron micrograph showing a pair of guard cells from the dicot tobacco (*Nicotiana tabacum*). The section was made perpendicular to the main surface of the leaf. The pore faces the atmosphere; the bottom faces the sub-stomatal cavity inside the leaf. Note the uneven thickening pattern of the walls, which determines the asymmetric deformation of the guard cells when their volume increases during stomatal opening. (Micrograph from Sack 1987, courtesy of F. Sack.)





REGULAÇÃO ESTOMÁTICA PELA LUZ AZUL

LUZ:

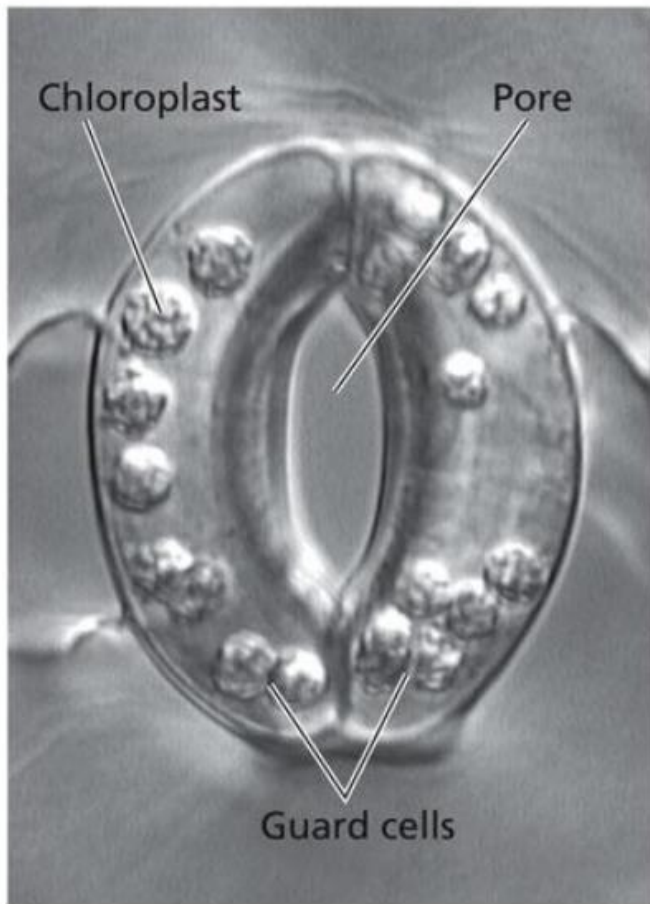
- Fotossíntese (fotoinibição) - energia
- Fotomorfogénese e Fototropismo - sinal (ambiental)

Luz vermelha e vermelho-longínquo (e azul): fitocromo - regula o desenvolvimento vegetativo e reprodutivo

Luz azul (vários receptores) - várias respostas: fototropismo, inibição do alongamento do hipocótilo, etc.

REGULAÇÃO ESTOMÁTICA

(A)



(B)



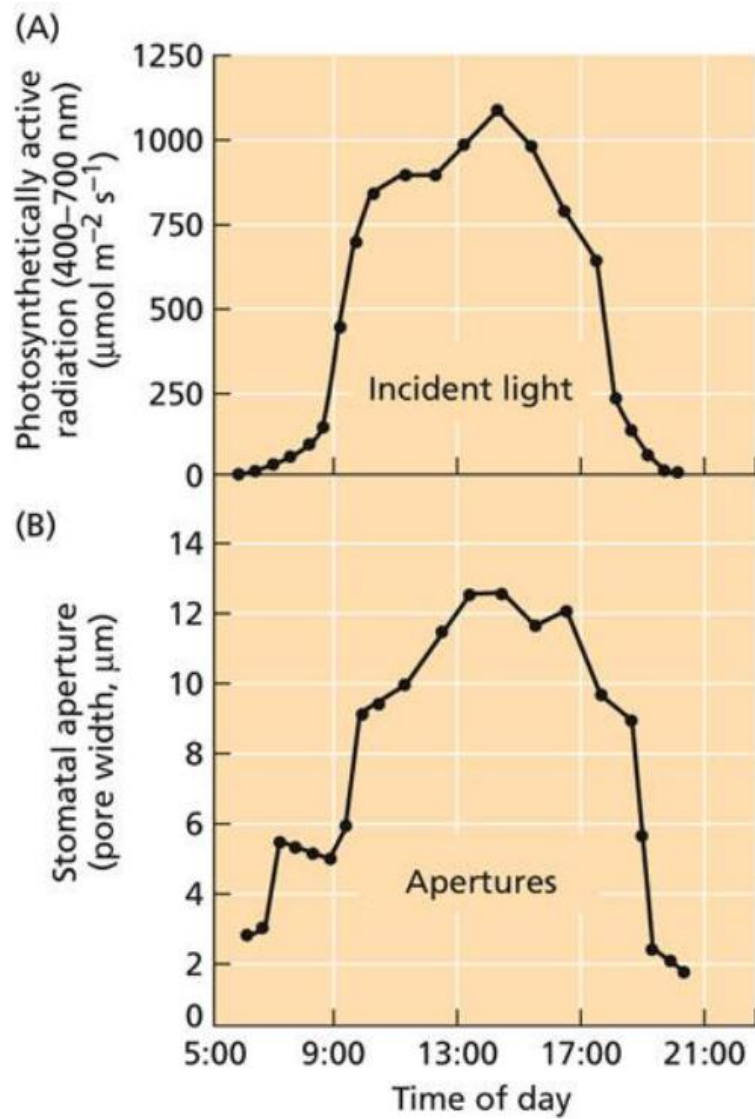
20 μm

PLANT PHYSIOLOGY, Fourth Edition, Figure 18.8 © 2006 Sinauer Associates, Inc.

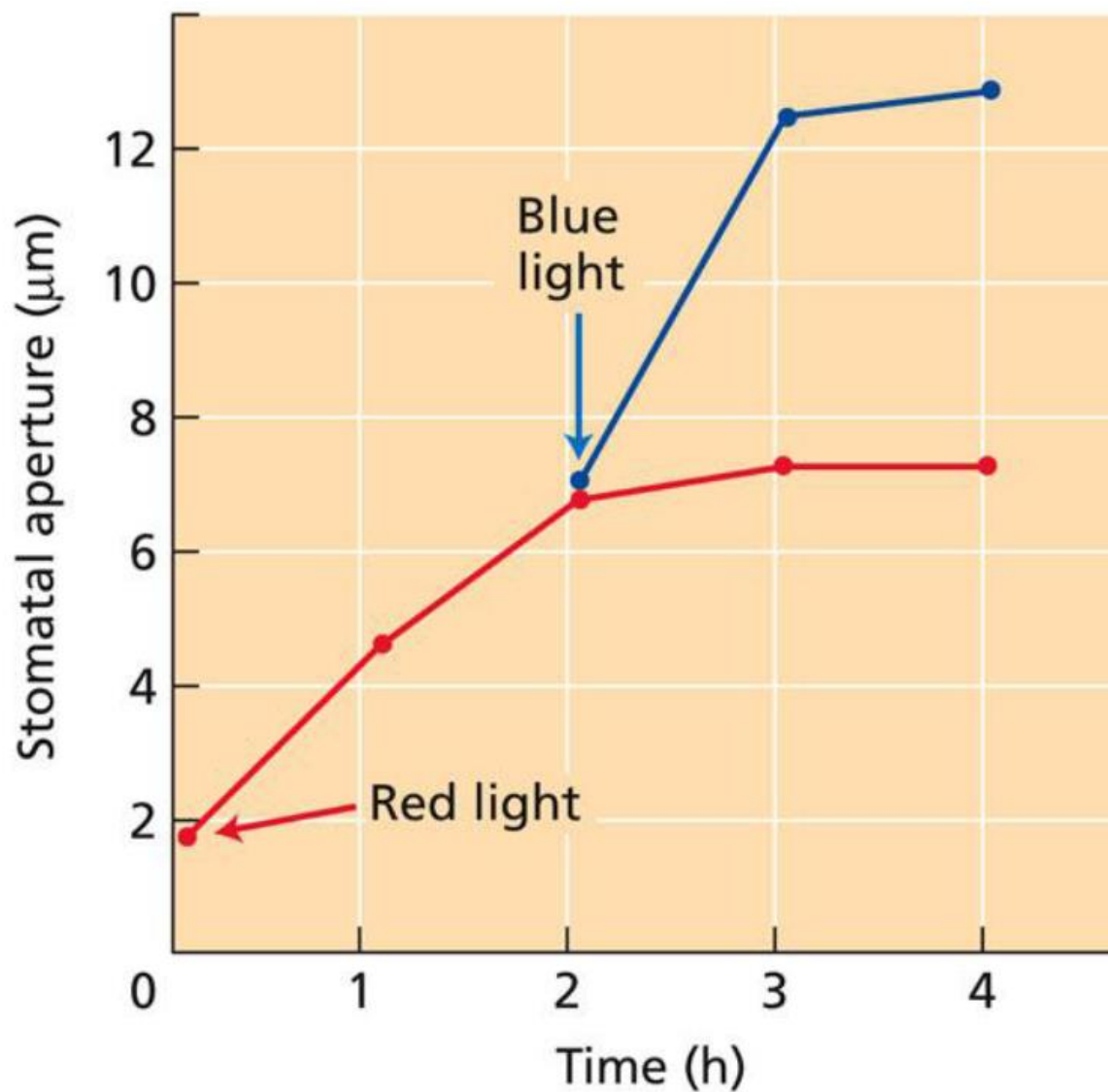
OS ESTOMAS ABREM QUANDO AS CÉLULAS-GUARDA FICAM TÚRGIDAS

PORQUE BAIXA O POTENCIAL HÍDRICO NAS CÉLULAS GUARDA?

- PORQUE SE ACUMULA SACAROSE
- PORQUE SE ACUMULA K^+ (e os seus contra-íões, Cl e malato $^{2-}$)



PLANT PHYSIOLOGY, Fourth Edition, Figure 18.9 © 2006 Sinauer Associates, Inc.



PLANT PHYSIOLOGY, Fourth Edition, Figure 18.10 © 2006 Sinauer Associates, Inc.

(A)

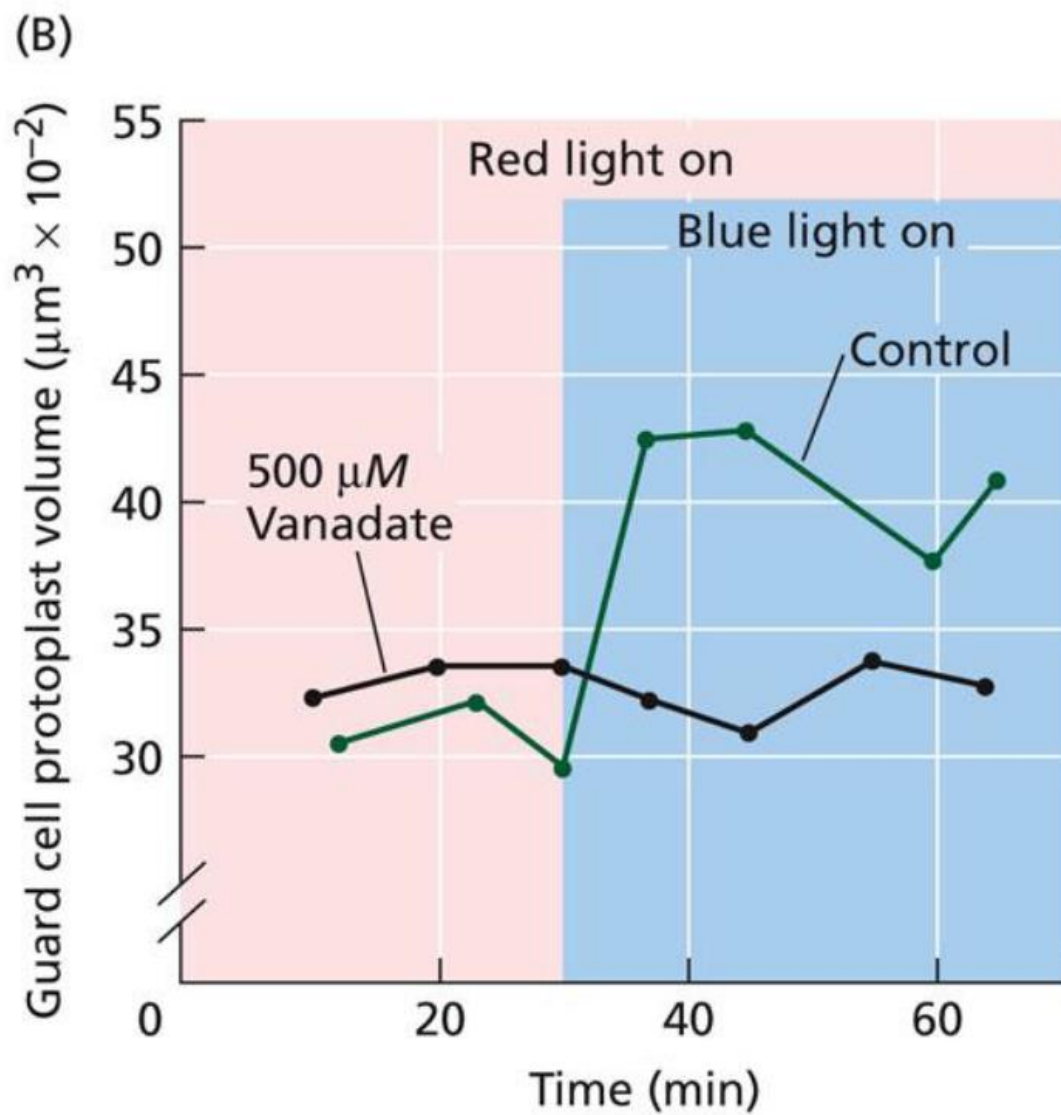


Protoplasts in dark

Blue light



Protoplasts swell in blue light



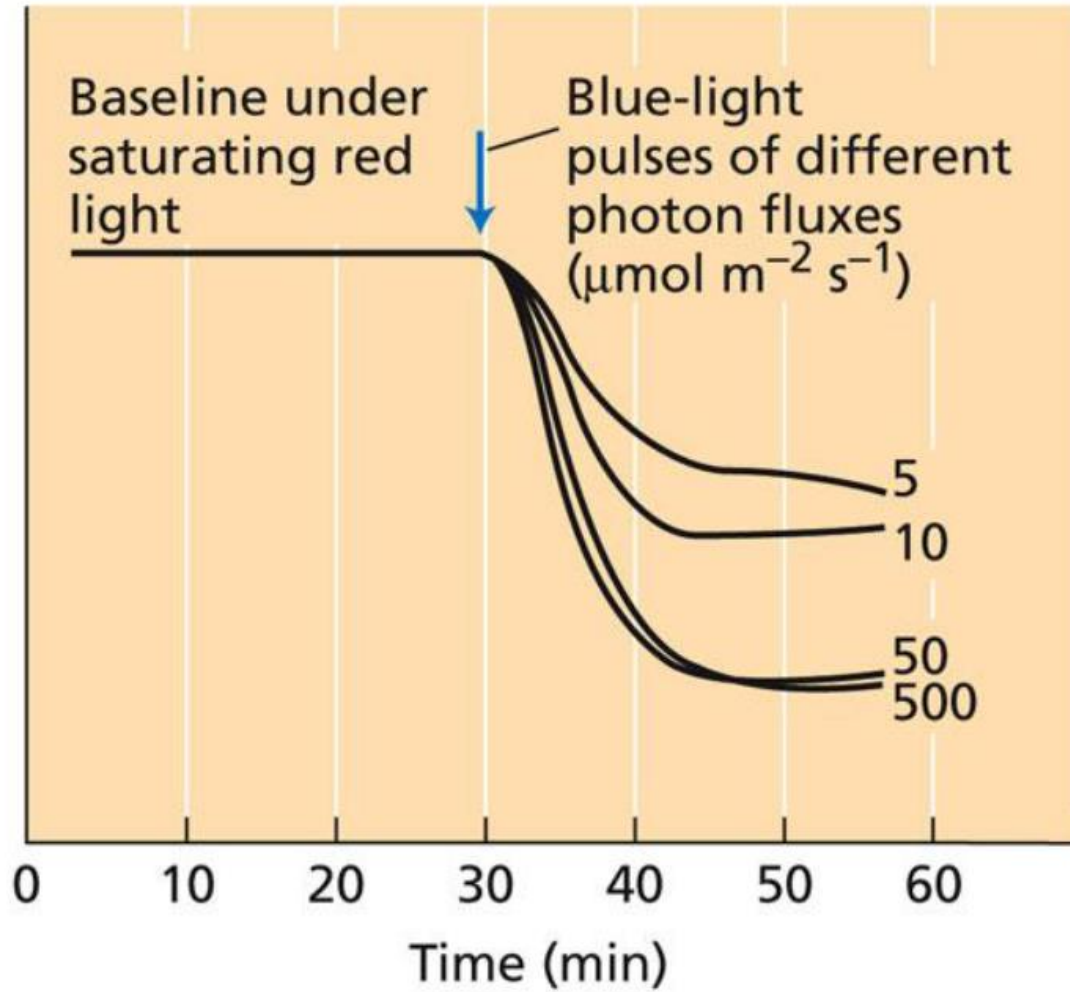
PLANT PHYSIOLOGY, Fourth Edition, Figure 18.12 (Part 2) © 2006 Sinauer Associates, Inc.

More alkaline



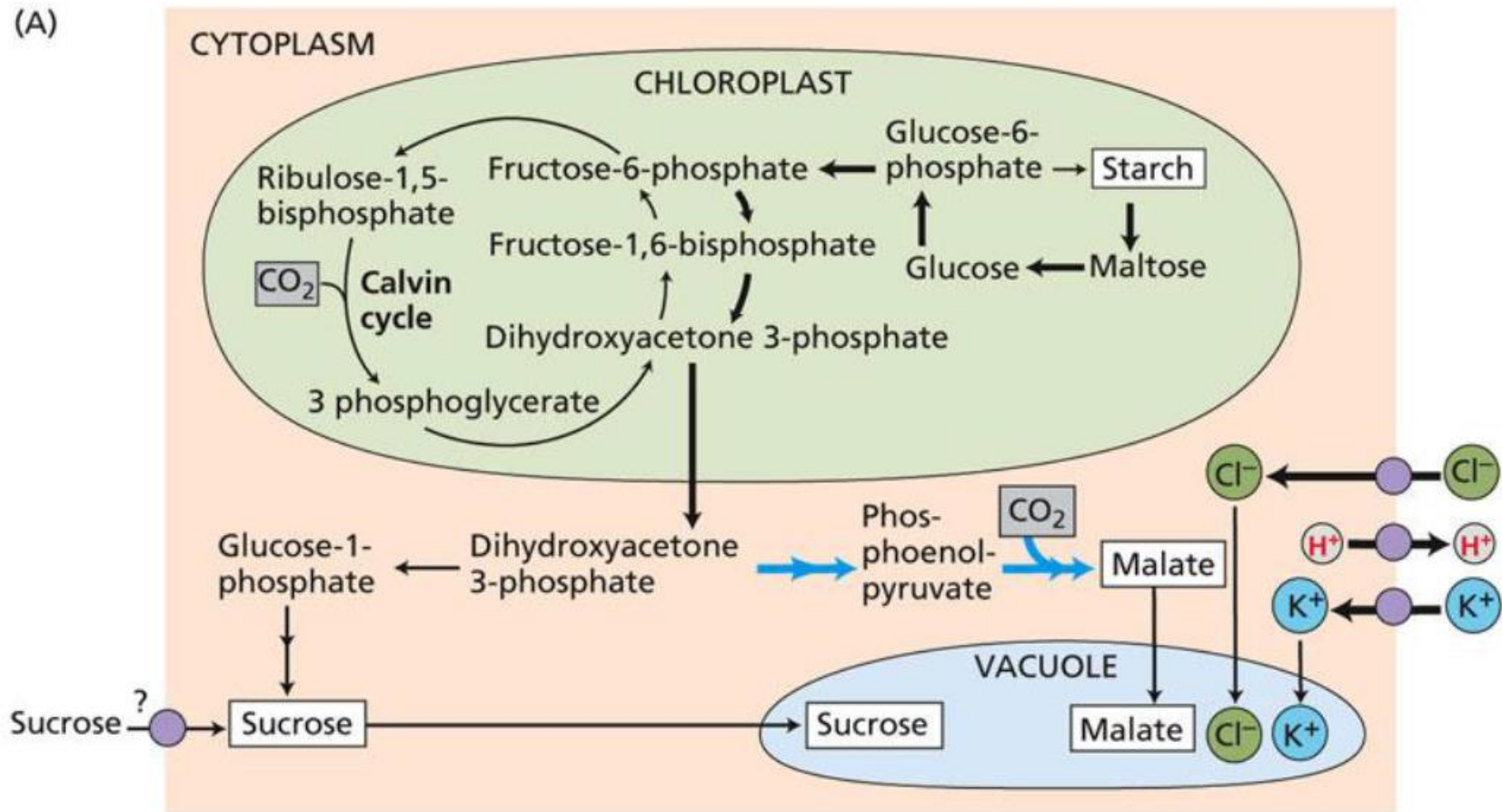
More acidic

pH of suspension medium



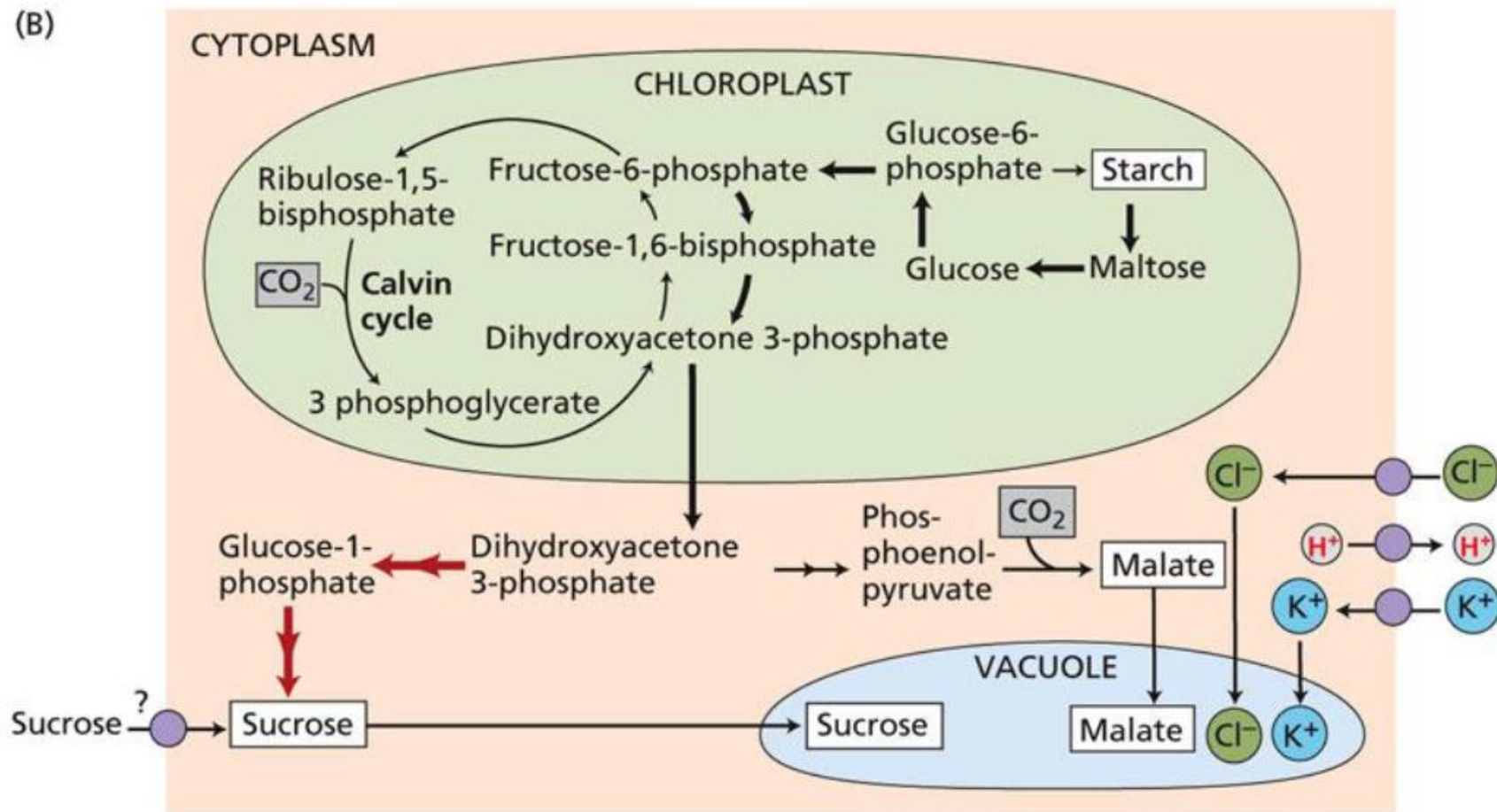
PLANT PHYSIOLOGY, Fourth Edition, Figure 18.13 © 2006 Sinauer Associates, Inc.

(A)



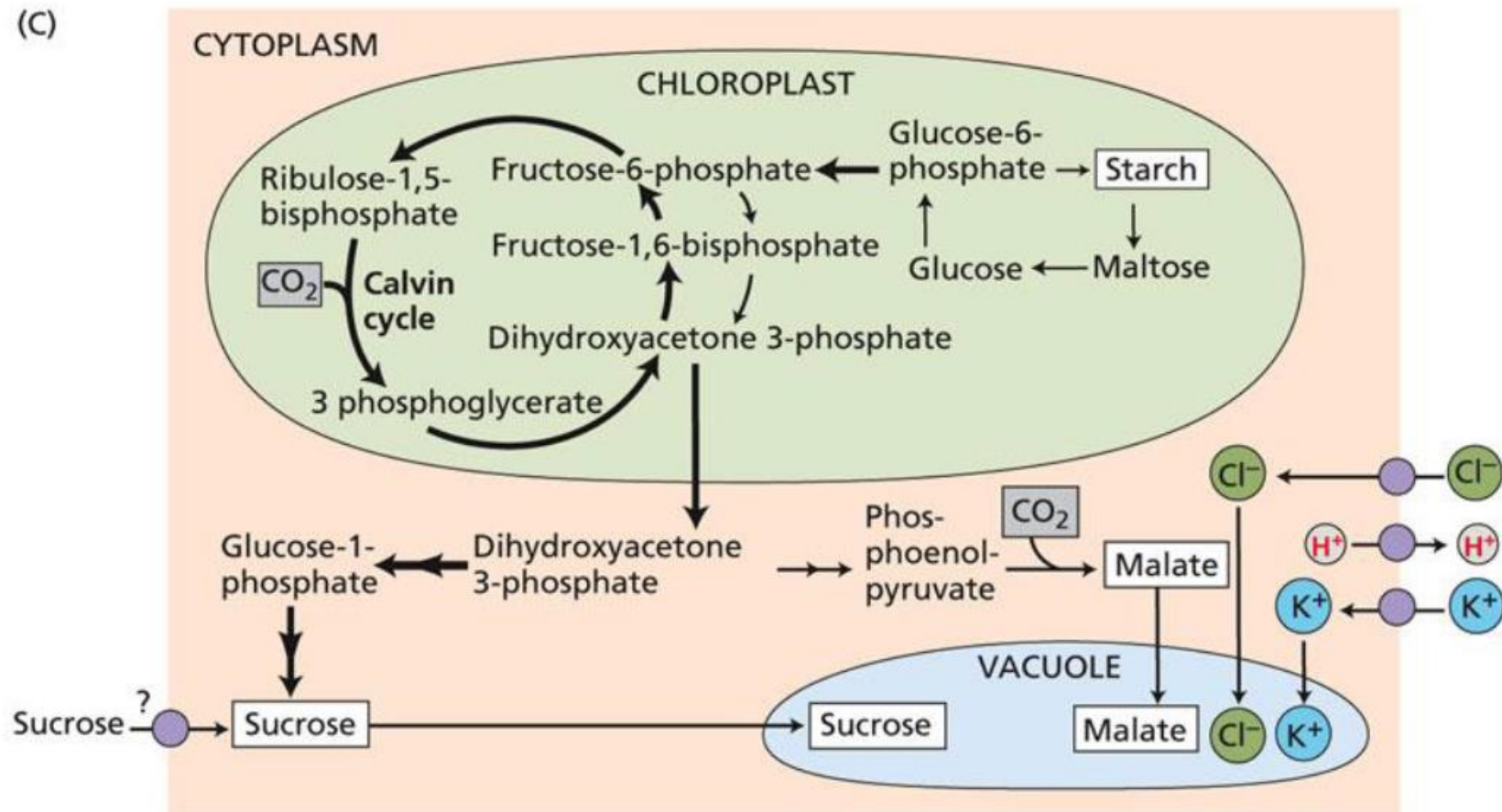
PLANT PHYSIOLOGY, Fourth Edition, Figure 18.15 (Part 1) © 2006 Sinauer Associates, Inc.

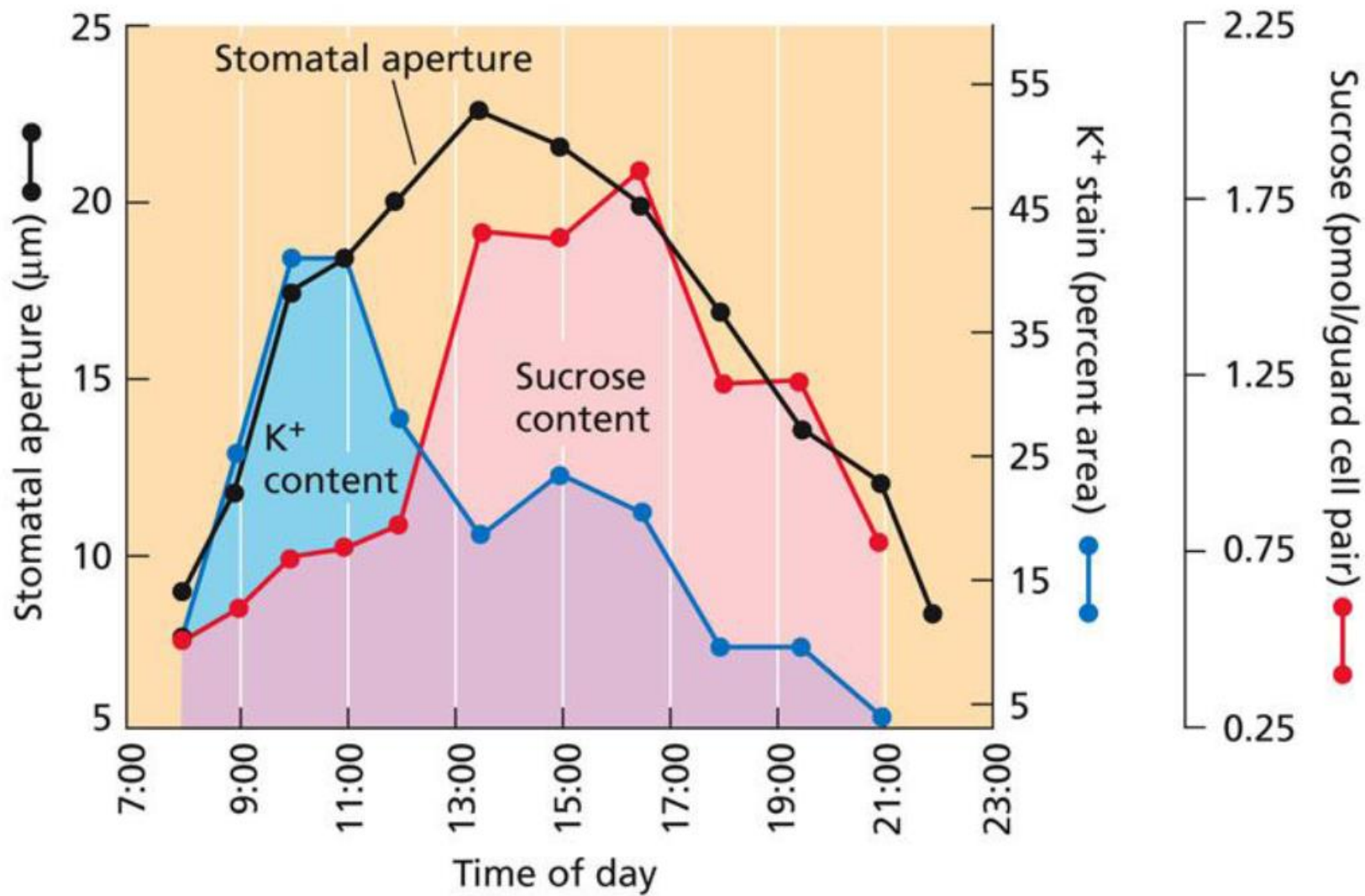
(B)



PLANT PHYSIOLOGY, Fourth Edition, Figure 18.15 (Part 2) © 2006 Sinauer Associates, Inc.

(C)





PLANT PHYSIOLOGY, Fourth Edition, Figure 18.16 © 2006 Sinauer Associates, Inc.

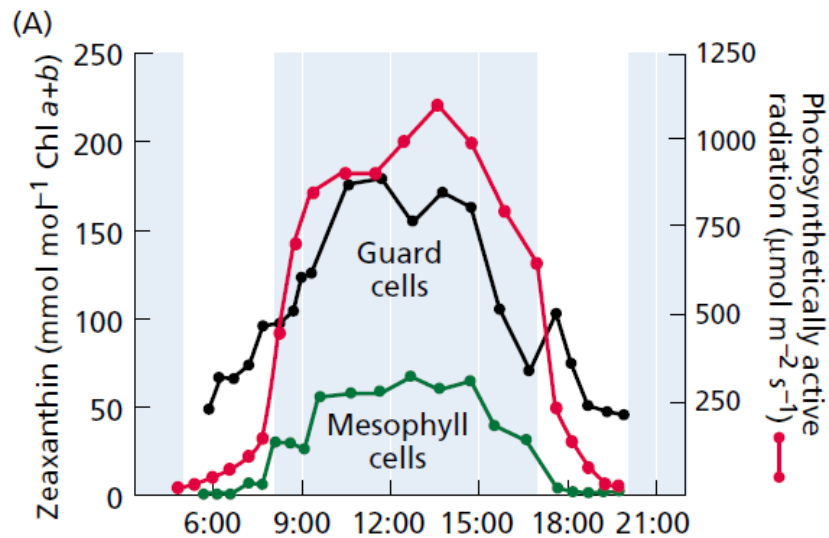
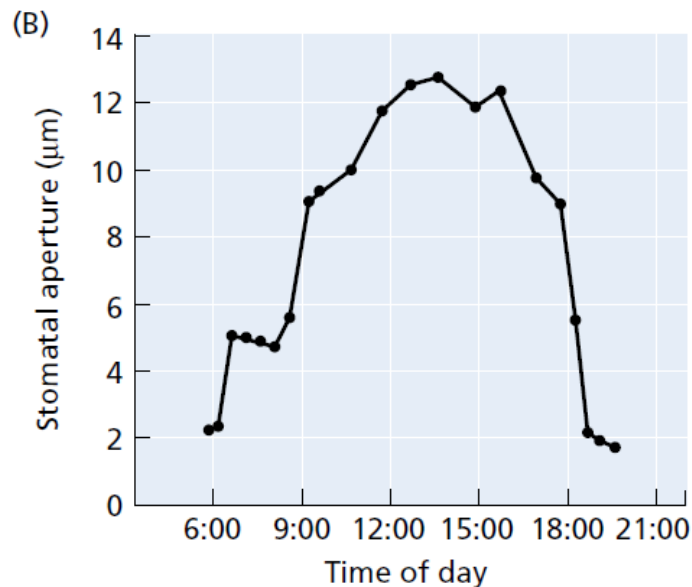


FIGURE 18.18 The zeaxanthin content of guard cells closely tracks photosynthetically active radiation and stomatal apertures. (A) Daily course of photosynthetically active radiation reaching the leaf surface, and of zeaxanthin content of guard cells and mesophyll cells of *Vicia faba* leaves grown in a greenhouse. The white areas within the graph highlight the contrasting sensitivity of the xanthophyll cycle in mesophyll and guard cell chloroplasts under the low irradiances prevailing early and late in the day. (B) Stomatal apertures in the same leaves used to measure guard cell zeaxanthin content. (After Srivastava and Zeiger 1995a.)



Taiz, L., Zeiger, E. (2002). Plant Physiology. 3rd Ed. Sinauer Associates, Sunderland.

***Checklist* de Conhecimentos e Competências a Adquirir:**

- Conhecer a estrutura dos estomas e a relação com a sua função.
- Compreender o papel da luz vermelha e da luz azul na abertura estomática.
- Ser capaz de descrever experiências que ilustram a forma como a luz azul promove a abertura estomática.

Sumário

Influência da “boundary layer” na transpiração. Constituição do aparelho estomático. Mecanismo de abertura estomática. Regulação estomática pela luz azul.

BIBLIOGRAFIA DA AULA

Nuclear

Taiz, L., Zeiger, E. (2006). Plant Physiology. 4th Ed. Sinauer Associates, Sunderland.
(capítulo 18, pp. 449 - 455)