

Universidade de São Paulo (USP)
Escola de Engenharia de Lorena (EEL)
Engenharia Ambiental

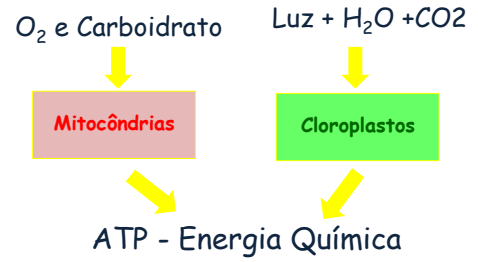


Cloroplasto e Fotossíntese

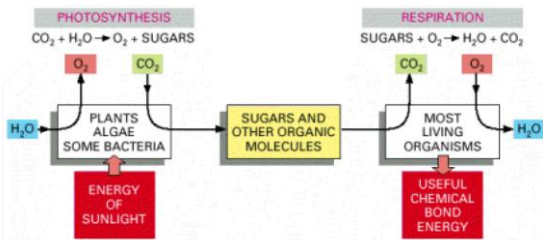
Disciplina: Biologia Geral
Prof: Tatiane da Franca Silva

Cloroplasto e Mitocôndria

✓ Obtenção de energia para a célula a partir diferentes fontes:



Fotossíntese e Respiração



Organismos Fotossintetizantes

❖ Eucarioto – Algas e Plantas

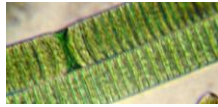
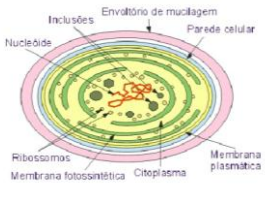
Presença de organela especializada: **Cloroplasto**



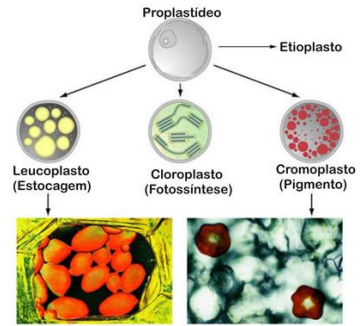
Organismos Fotossintetizantes

❖ Procariotos

Ex: Cianobactérias



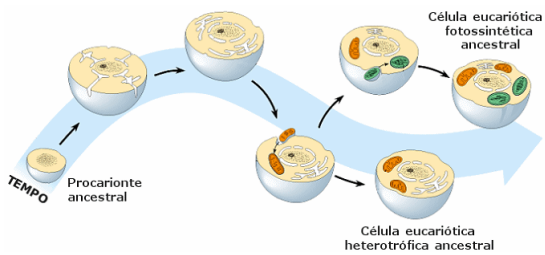
Cloroplastos e outros plastídeos



Origem dos cloroplastos

✓ Teoria do Endossimbionte

✓ Eucarioto Fotossintetizante: 2 eventos de endossimbiose



✓ *Hatena arenicola* e seu Endossimbionte *Nephroselmis*

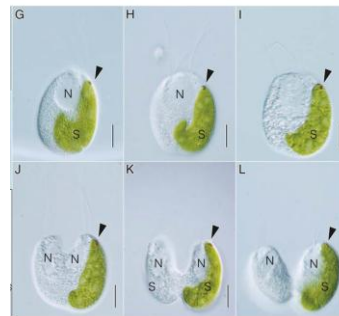
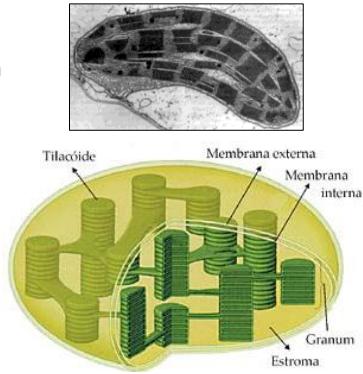


Figure 1. *Hatena arenicola* gen. et sp. nov. A, Ventral view of a symbiont-bearing cell showing two flagella and an invagination of the symbiont (arrowhead). B,C, Sampling site. D, The same cell in a different focal plane, showing two rows of conspicuous Type I apicalomes. E, A cell lacking the symbiont. F, A cell with an "anomalous" symbiont. G-L, Cell division in *Hatena arenicola*, where the arrowhead indicates an invagination of the symbiont. Each panel shows a different individual at a different stage in cell division. N: nucleus. S: Symbiont. The scale bar is 10µm in A, D-L.

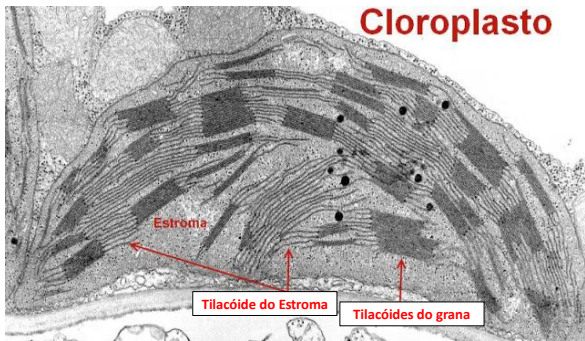
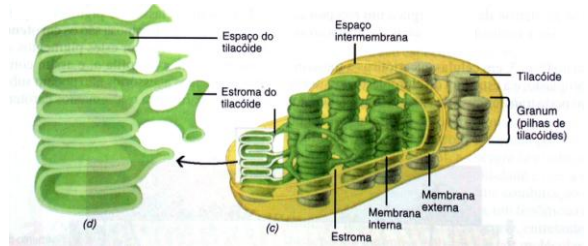
Estrutura dos Cloroplastos

- ✓ Membrana Externa
- ✓ Membrana Interna
- ✓ Estroma
- ✓ Tilacóides
- ✓ Grana

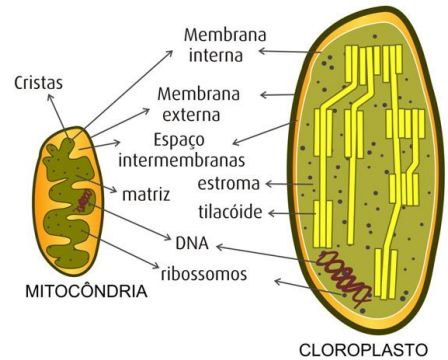


Cloroplasto: 3 Compartimentos

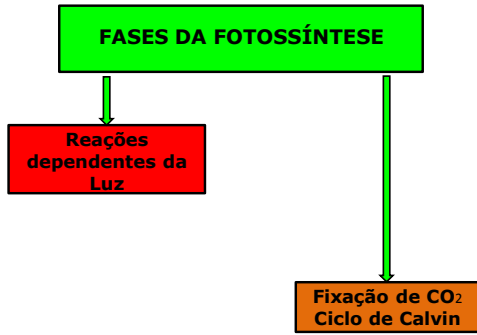
- ✓ Espaço Intermembrana, Estroma e Espaço do Tilacóide



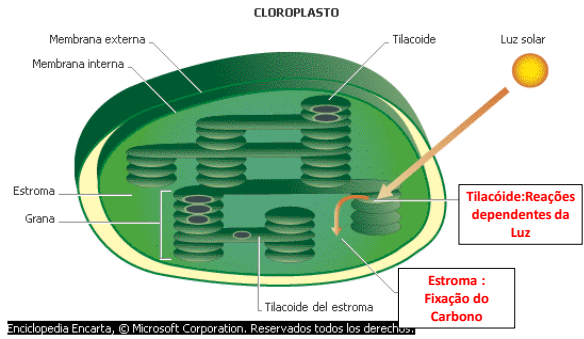
Mitocôndria X Cloroplasto



Fotossíntese

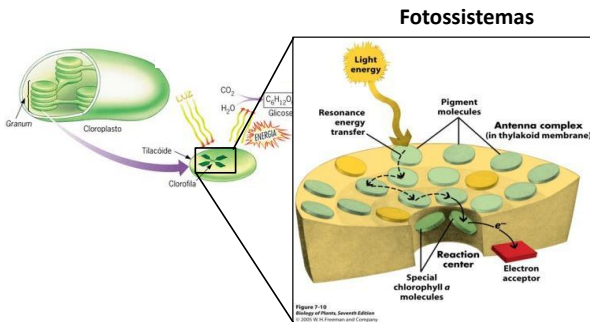


Caminho da Fotossíntese



Reações Luminosas: Membrana do Tilacoídes

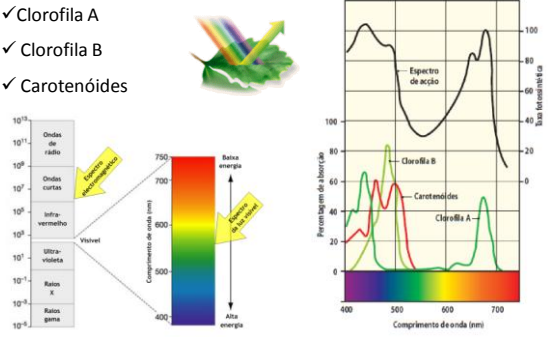
❖ Presença de Pigmentos Fotossintetizantes



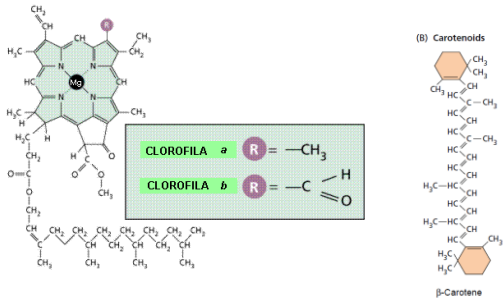
Pigmentos Fotossintéticos

Moléculas capazes de absorver a energia do Sol

- ✓ Clorofila A
- ✓ Clorofila B
- ✓ Carotenóides

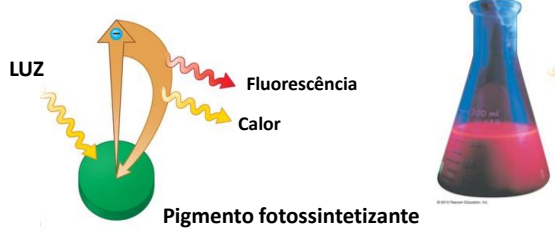


Pigmentos Fotossintéticos



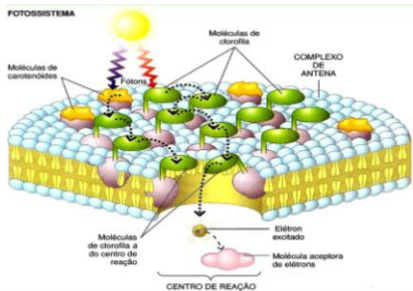
Caminho da Energia

- ❖ Pigmentos fotossintetizantes energizados
- ❖ Estado energizado \longrightarrow Estado original
- ❖ Transferência de energia, Liberação de Calor , Fluorescência ou transferência de elétron



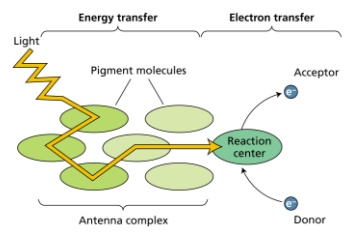
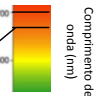
Fotossistemas

- ✓ **Complexo Antena:** captura a energia da Luz
- ✓ **Centro de Reação:** sítio onde a energia da Luz pode ser utilizada



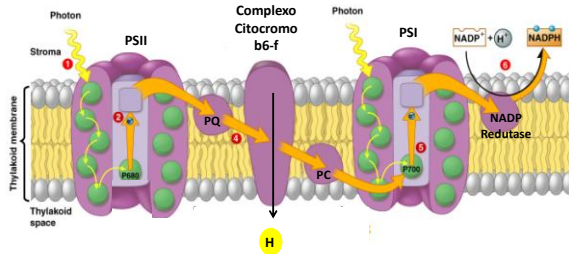
Dois Tipos de Fotossistemas

- ✓ **Fotossistem I (PSI):** Absorve na faixa de 700 nm
- ✓ **Fotossistema II (PSII):** Absorve na faixa de 680nm
- ✓ Diferem quanto ao doador de elétrons



Fotosistema I e II

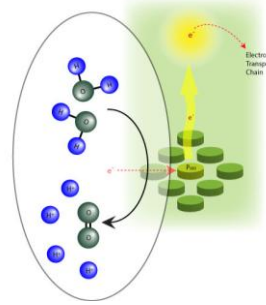
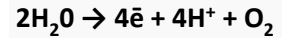
✓ PSI e PSII : Conectados pela Cadeia Transportadora de Elétrons



Copyright © 2005 Pearson Education, Inc. Publishing as Pearson Benjamin Cummings. All rights reserved.

PQ: Palstoquinona PC: Plastocianina

Fotosistema II: Fotólise da água



Carreador energético

❖ NADPH: Nicotinamida adenina dinucleotídeo fosfato

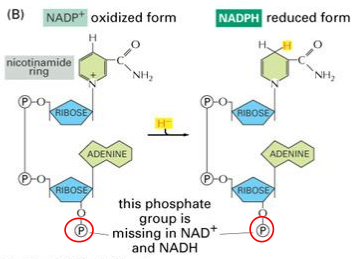
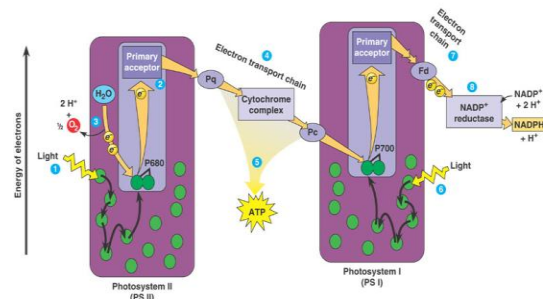


Figure 3-35 Essential Cell Biology, 2/e. (© 2004 Garland Science)

Fluxo de Elétrons: da Água ao NADP⁺

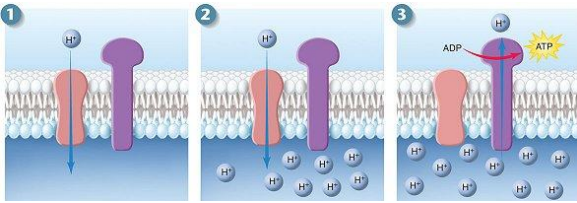
✓PSII: doa elétrons para PSI e recebe da Oxidação da Água

✓PSI: doa elétrons para NADP recebe elétrons de PSII

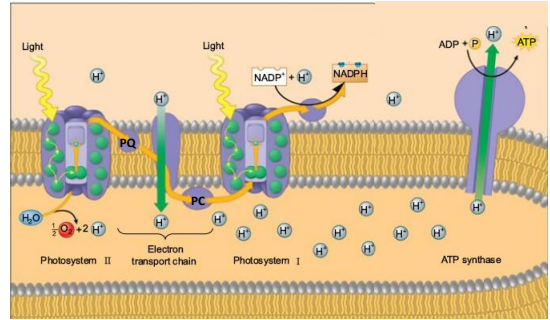


Cloroplasto e Mitocôndria

- ✓ Produção de Energia: Baseado em Membranas
- ✓ Síntese de ATP :acoplado ao transporte de elétrons.

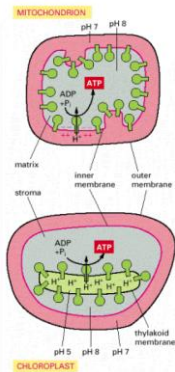


Síntese de ATP



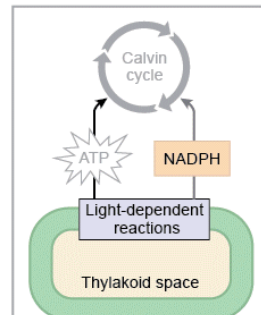
Mitocôndria X Cloroplasto

- ✓ Mitocôndria:
 - Espaço Intermembrana: \uparrow H^+
 - Síntese de ATP para a Matriz.
- ✓ Cloroplasto:
 - Espaço do Tilacóide: \uparrow H^+
 - Síntese de ATP para o Estroma



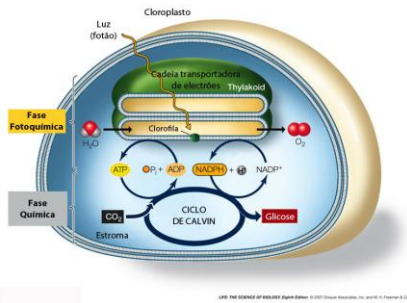
NADPH e ATP para o Estroma.

- ✓ Reações Luminosas: ATP, NADPH e O_2



Reações de Fixação do CO₂

- ✓ Ocorrem no Estroma
- ✓ Utiliza a Energia Produzida na Fase Luminosa



Reações de Fixação do CO₂

- ✓ 1 Molécula de Ribulose
- Fixa 1 molécula de CO₂
- ✓ São necessárias 3 moléculas de CO₂ para produzir 1 gliceraldeído 3 fosfato

