

ANABOLISM I

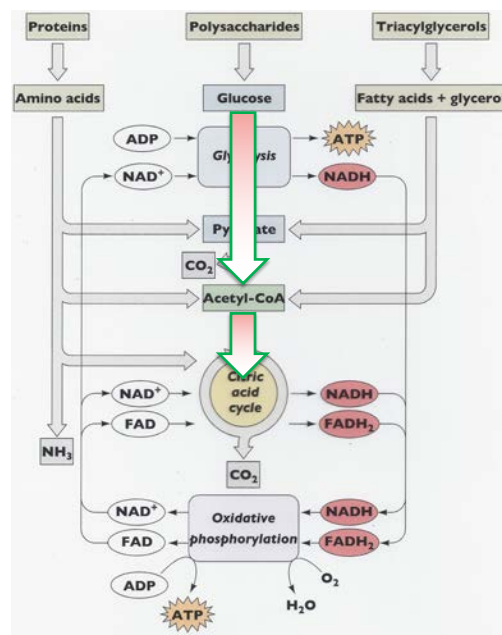
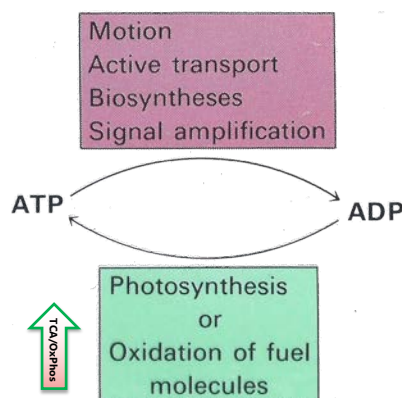
Carbohydrates

Photosynthesis and Carbohydrate Synthesis in Plants

Introduction to Anabolic Pathways

So far, we were mainly concerned with **CATABOLISM**: how to extract energy from biomolecules.

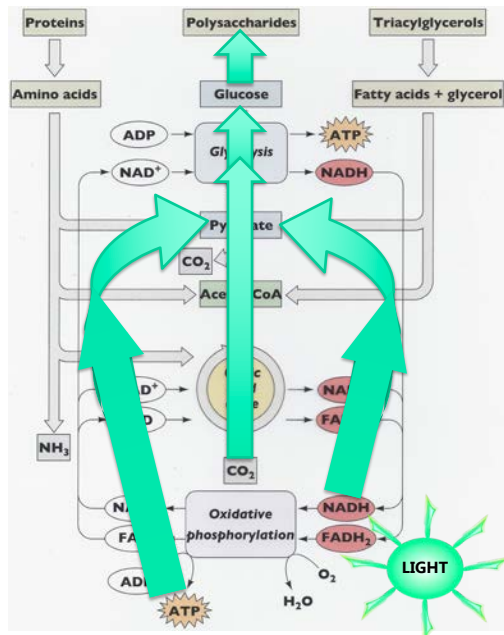
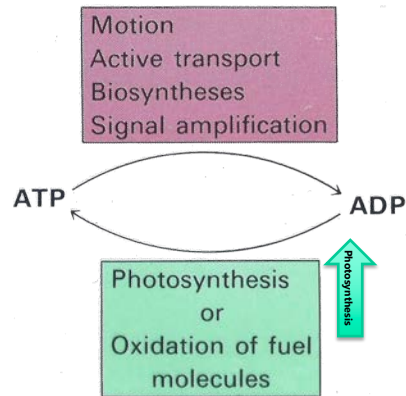
The rest of the semester we'll be concerned with **ANABOLISM**: how to build biomolecules.



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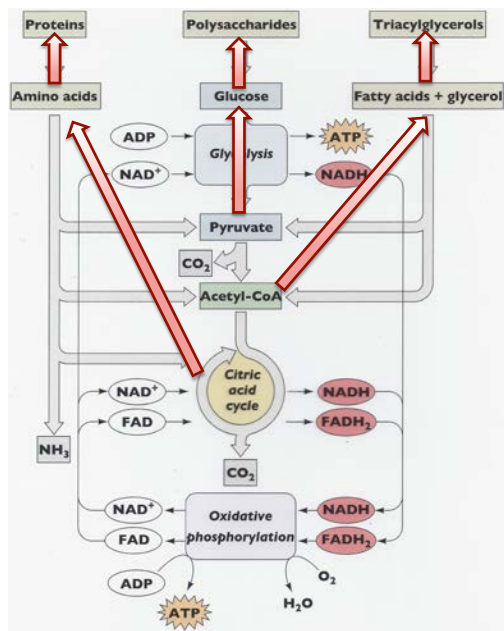
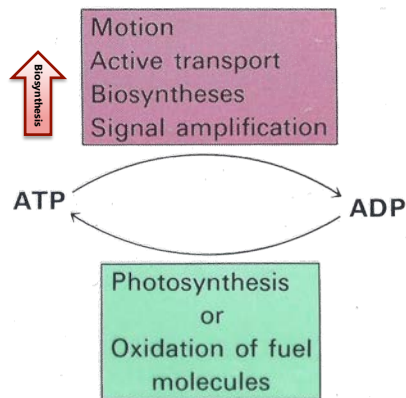
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Introduction to Anabolic Pathways

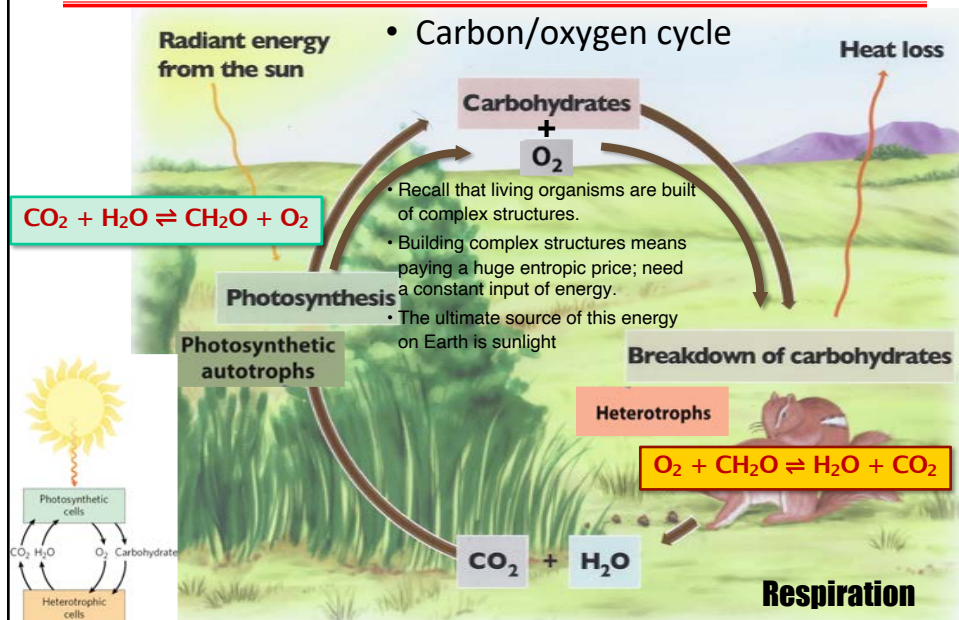
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Photosynthesis

Metabolism



Photosynthesis

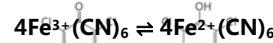
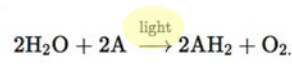
Key topics:

$$\Delta E' = -0.45V \rightarrow +41 \text{ kcal/mol}$$

- Photosynthetic electron transfer and photophosphorylation
- CO_2 assimilation in photosynthetic organisms
- Photorespiration in C_3 plants
- Avoiding photorespiration in C_4 plants

Key experiments:

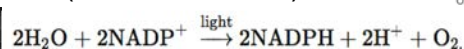
- ❖ Light caused O_2 (Hill reaction)



Robert (Robin) Hill

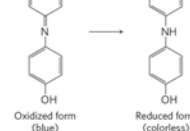


- ❖ Light caused reduction of NADPH (Ochoa reaction)



∴ light causes electron flow to NADPH (=A)

....The lack of involvement of CO_2 in this light-caused oxygen production was definitively shown in 1941



∴ light causes electron flow, and O_2 evolution that did not involve any CO_2 .

Photosynthesis



❖ Light caused evolution of O_2 – Hill reaction: $2H_2O + 4Fe^{3+}(CN)_6 \xrightarrow{h\nu} 4Fe^{2+}(CN)_6 + 4H^+ + O_2$

