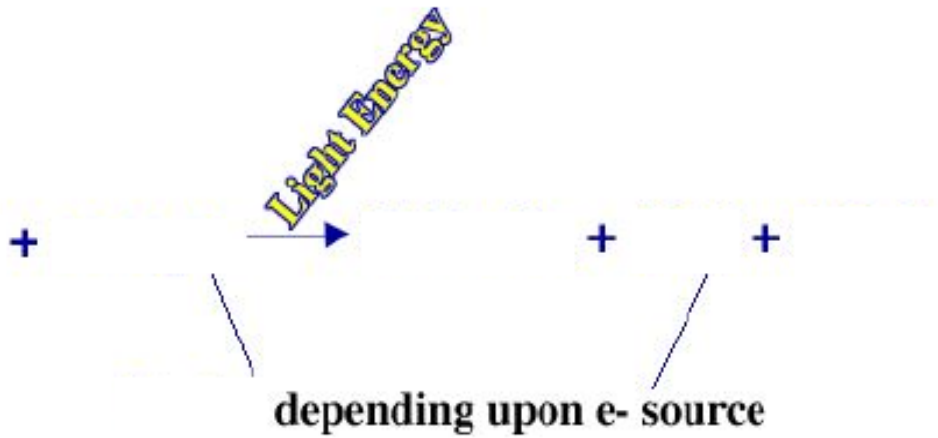
VIII. Phototrophs

A. Photosynthesis = The



Photosynthesis

- Derive E from
and conserve
it as

- Convert

of C (C " ")

photosynthesis

Reactions don't require light, but do require

plants, algae and

photosynthesis

SO_4^{2-}

A. The role of photosynthetic pigments

Chlorophylls, carotenoids and phycobilins =

. They vary in color depending upon the wavelength of light that they absorb.

1. (cyanobacteria)
2. (purple and green bacteria) - absorbs than those absorbed by chlorophyll *a*.
3. Carotenoids and phycobilins - accessory pigments that light utilization.

*These pigments are organized in protein complexes called .

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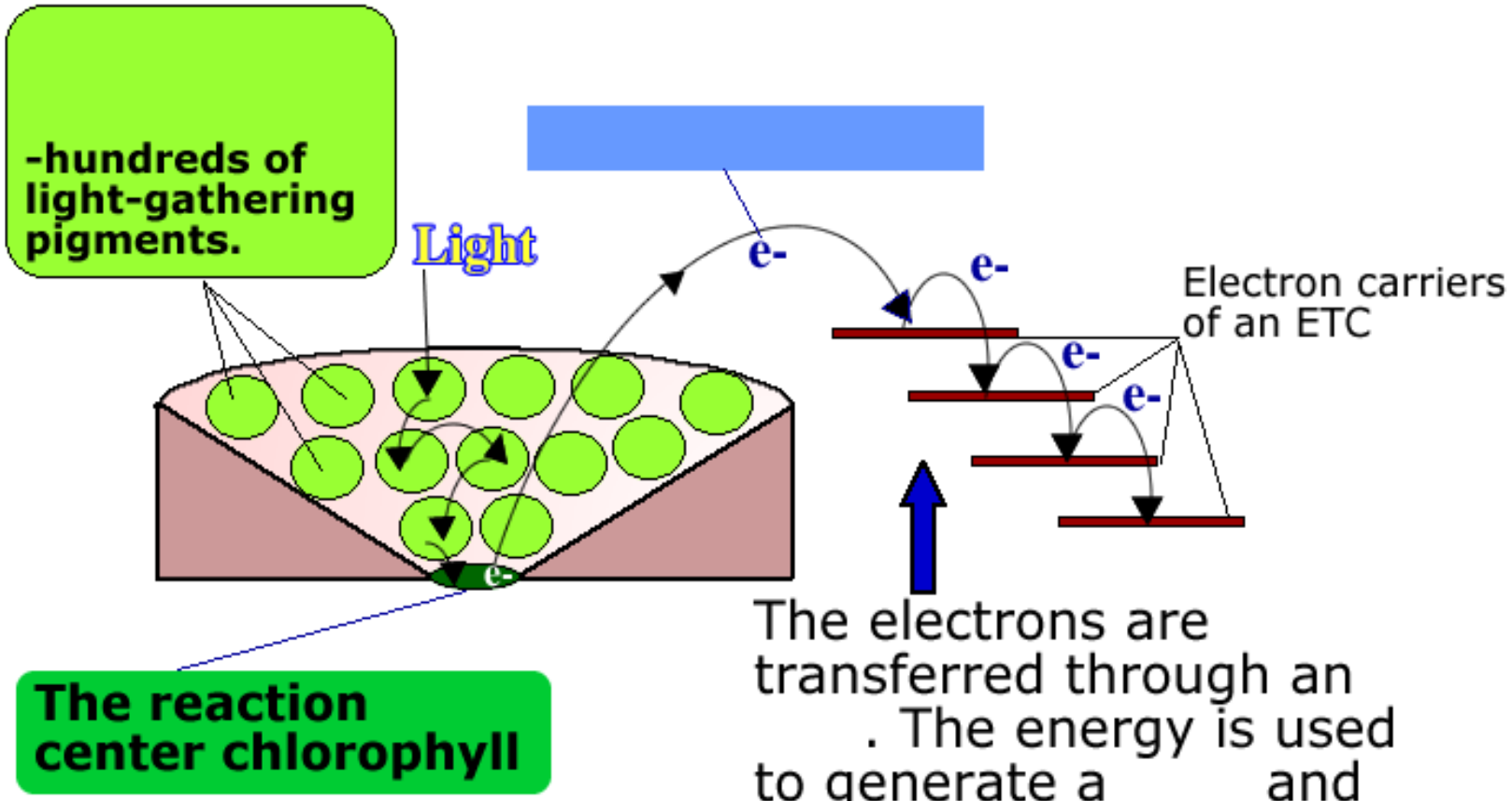
B. Photophosphorylation

Photosystem



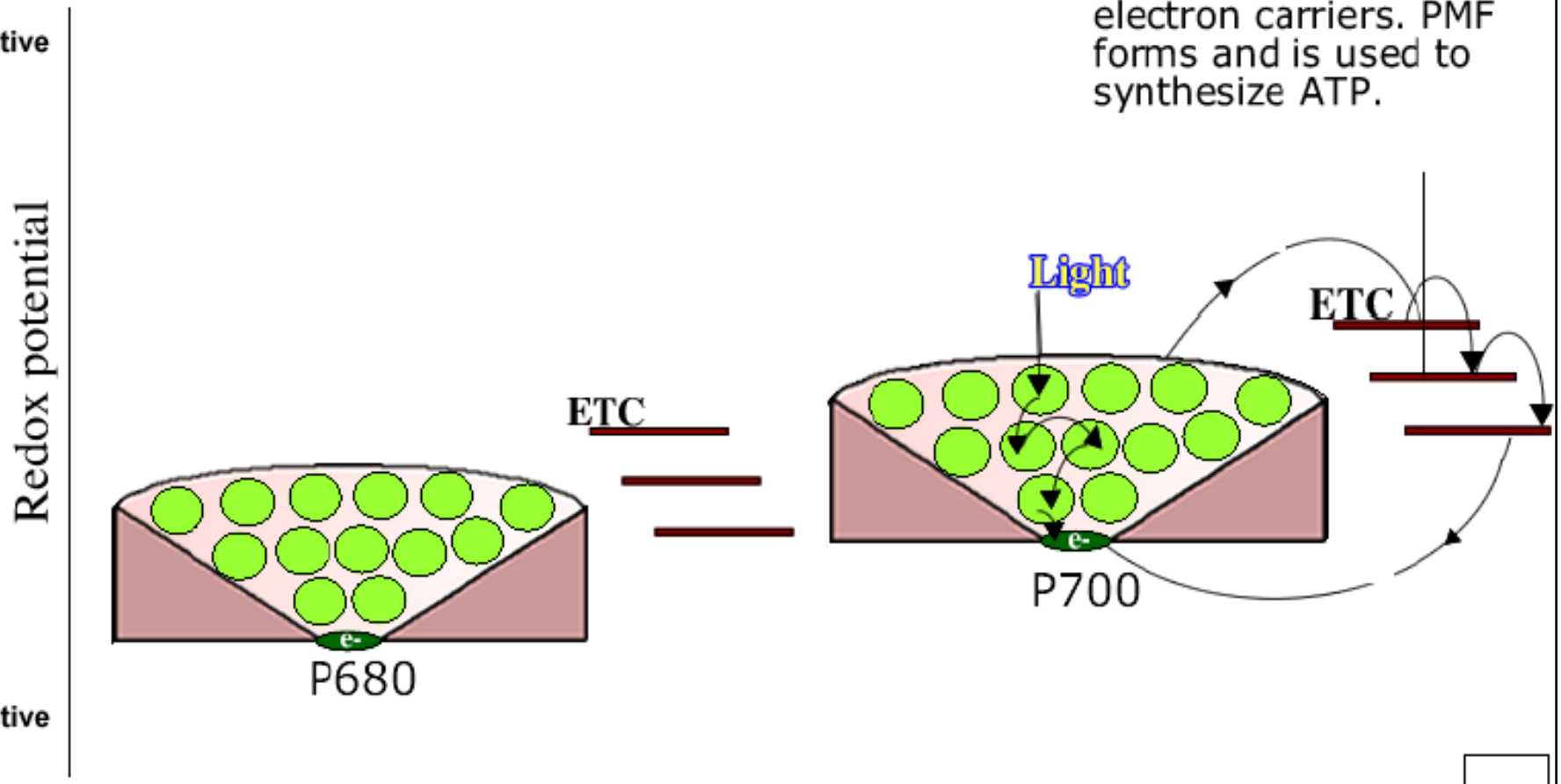
The electrons are transferred through an . The energy is used to generate a and is made via

1. In oxygenic phototrophs there are of photosystems: Photosystem I and Photosystem II.
2. When a cell needs to synthesize ____ and not , it will use only in a process called

Photosystems in oxygenic phototrophs

Cyclic photophosphorylation

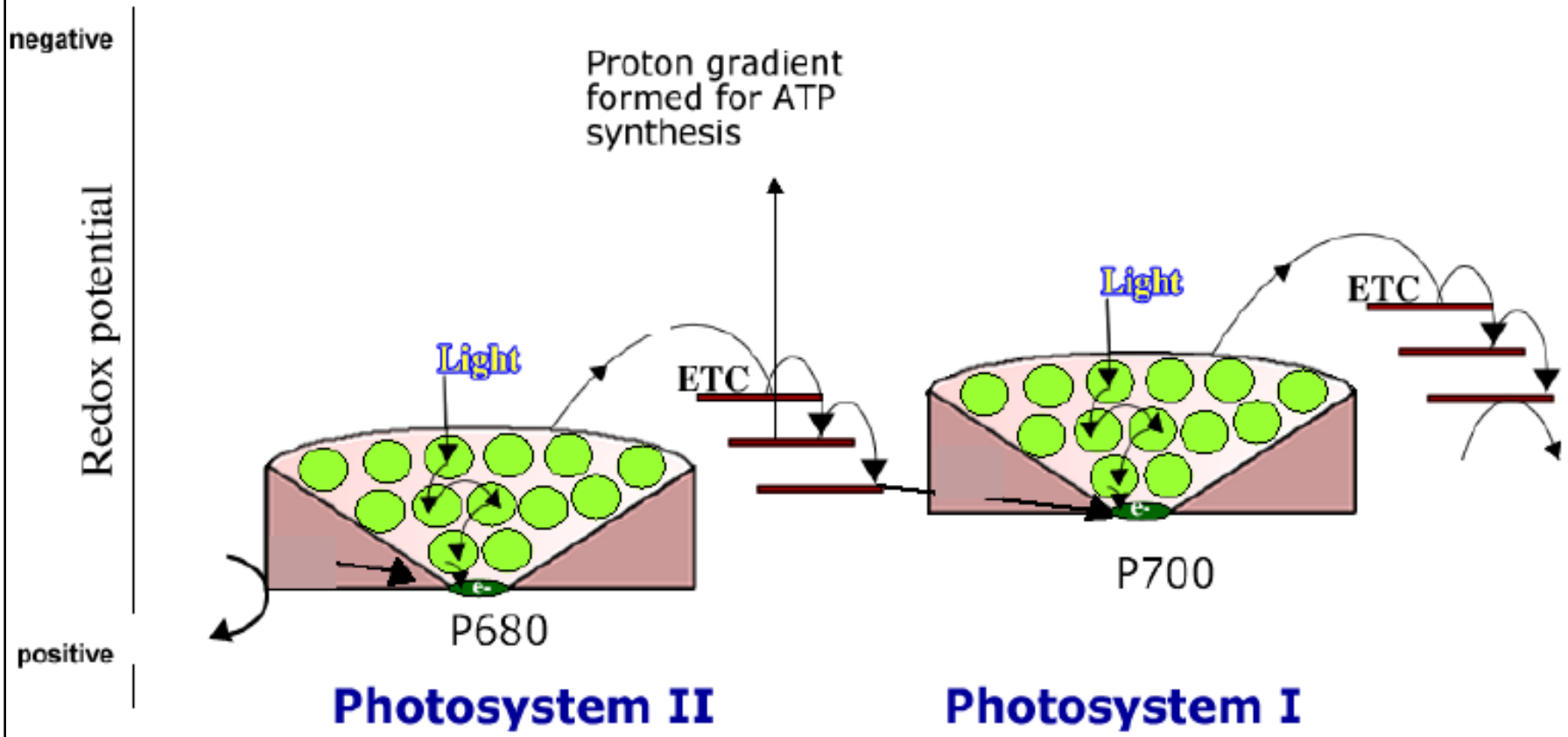
Electrons are passed through a series of electron carriers. PMF forms and is used to synthesize ATP.



3. When a cell needs to synthesize ATP and reducing power, it will use photosystem I and photosystem II in a process called

Photosystems in oxygenic phototrophs

Non-cyclic photophosphorylation



Remember the combustion reaction that represents the catabolism of glucose:

$C_6H_{12}O_6 + 6O_2 \text{ ----> } 6CO_2 + 6H_2O \qquad \Delta G = -686 \text{ kcal/mol}$

How does this reaction relate to carbon fixation (a.k.a dark rxns)??

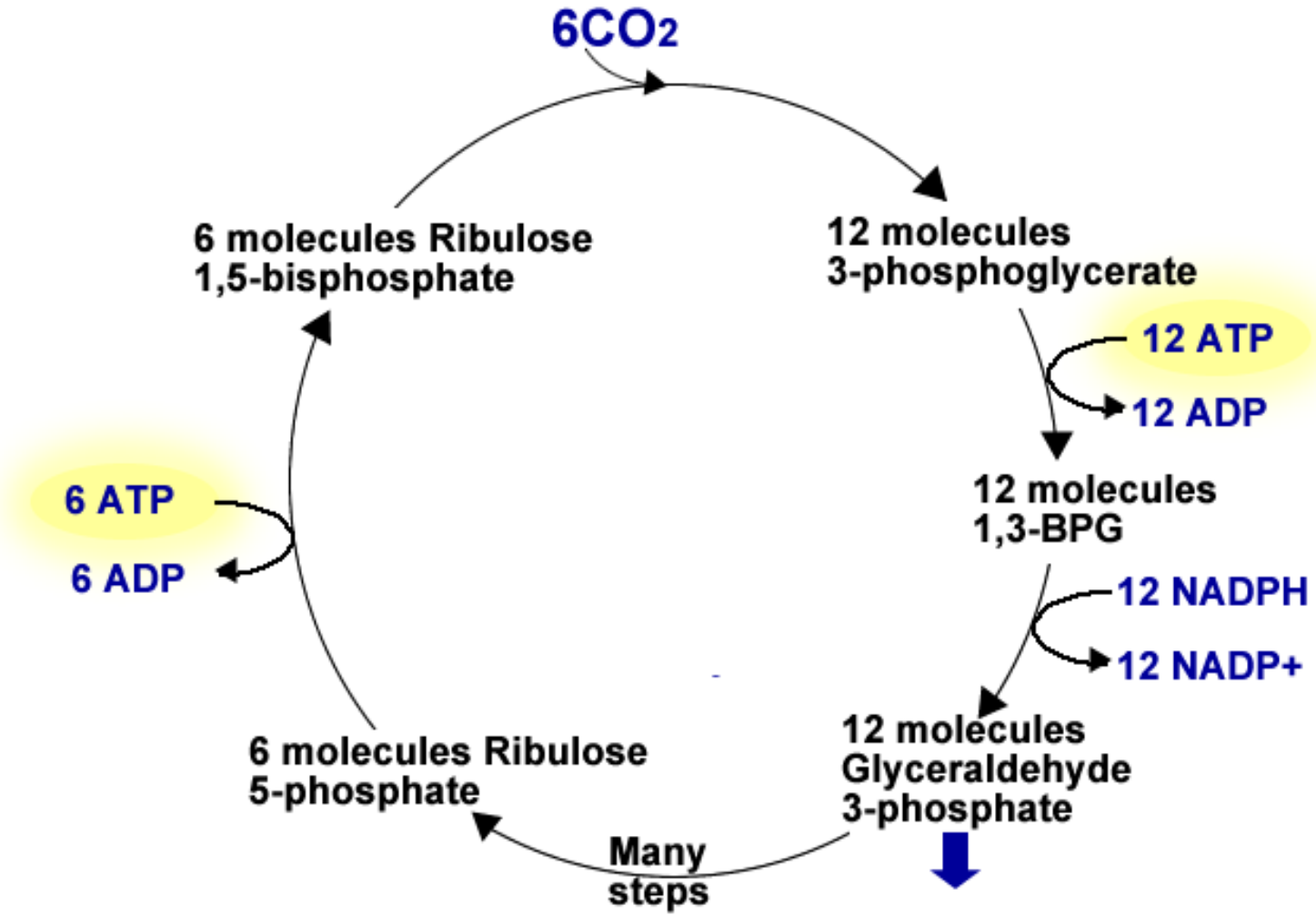
What other group of organisms must be able to "fix" carbon?

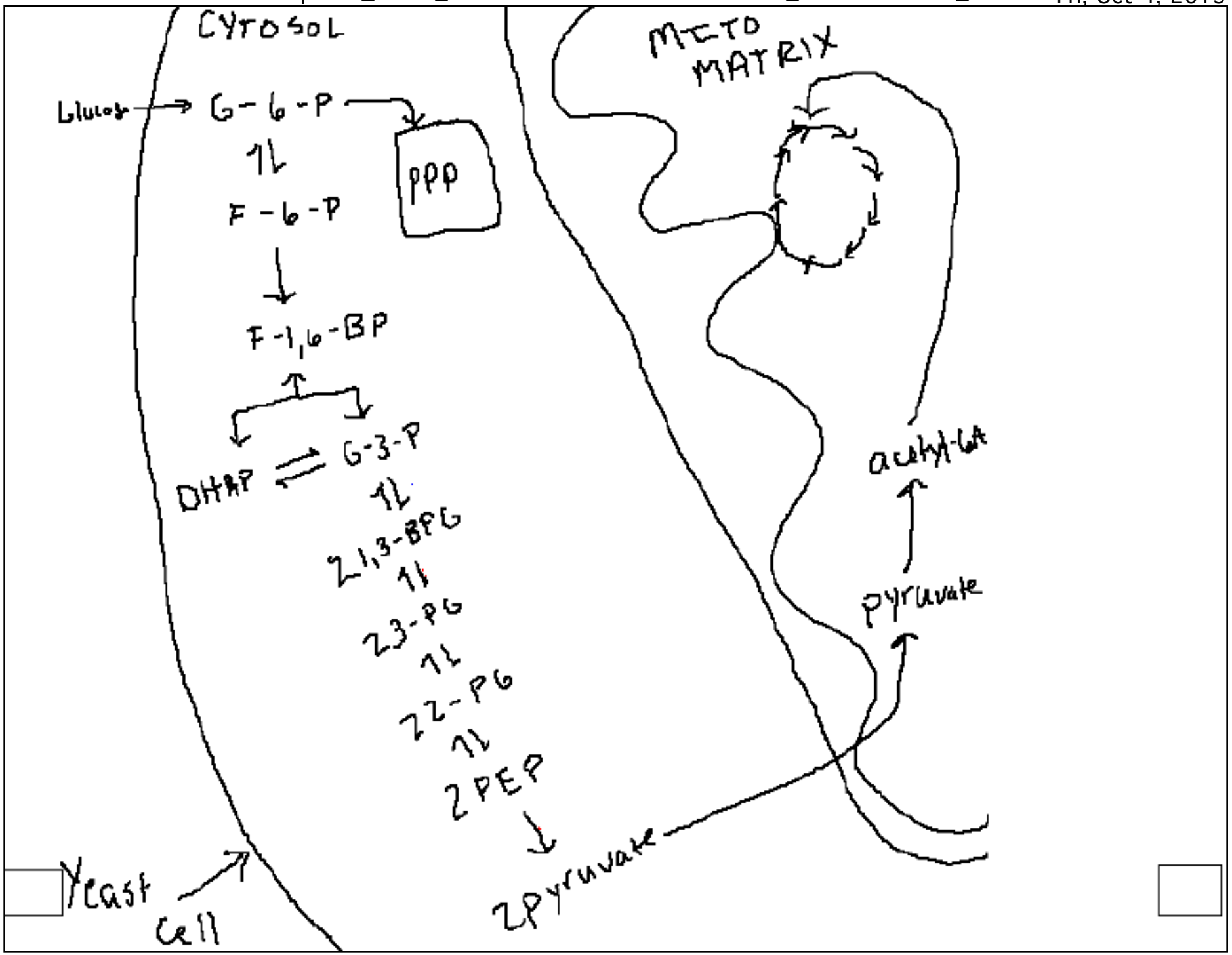
VII. Carbon fixation

The Calvin Cycle (**The dark reactions**)

$$6\,CO_2 + 18\,ATP + 12\,NADPH + 12H^+ + 6H_2O \longrightarrow C_6H_{12}O_6 + 18\,ADP + 18\,Pi + 12\,NADP^+$$

TOTAL YIELD: ATP and NADPH are used to yield




CYTOSOL
MITO MATRIX
Glucose
G-6-P
PPP
F-6-P
F-1,6-BP
DHAP
G-3-P
2 1,3-BPG
2 3-PG
2 2-PG
2 PEP
2 Pyruvate
acetyl-CoA
pyruvate
Yeast Cell

IX. Anabolic pathways

A. Lipid synthesis

1. Fatty acids are synthesized when from acetyl-CoA are added to a constantly elongating chain of carbon atoms. The chain is held by .

2. Glycerol is synthesized from

B. Amino acid synthesis

1. Some are synthesized from precursor metabolites formed during

2. Some are derived from compounds of the (e.g. α-ketoglutarate is used to synthesize)

3. Aromatic amino acids are sometimes synthesized from precursors of the .

4. Synthesis pathways are often regulated by .

C. Nucleotide synthesis

-complex construction. Purine and pyrimidine rings are constructed from .