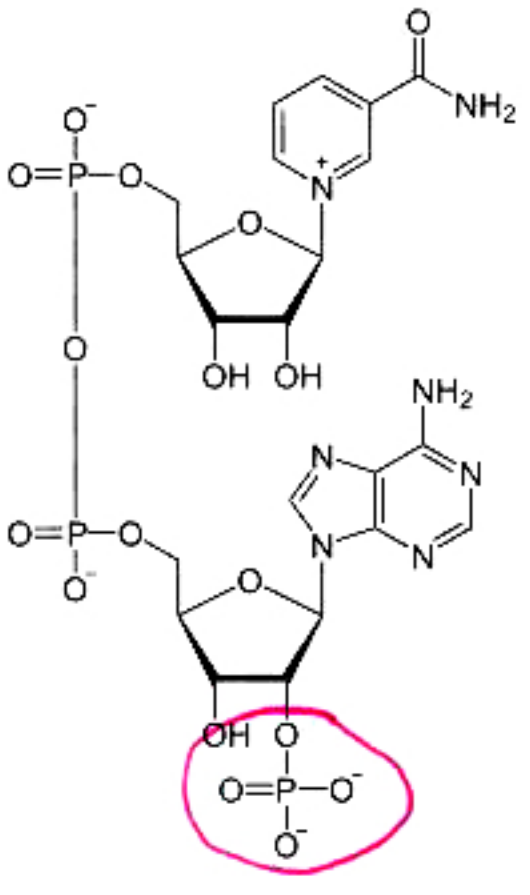
Module 12

Pentose Phosphate Pathway

Session Slides with Notes

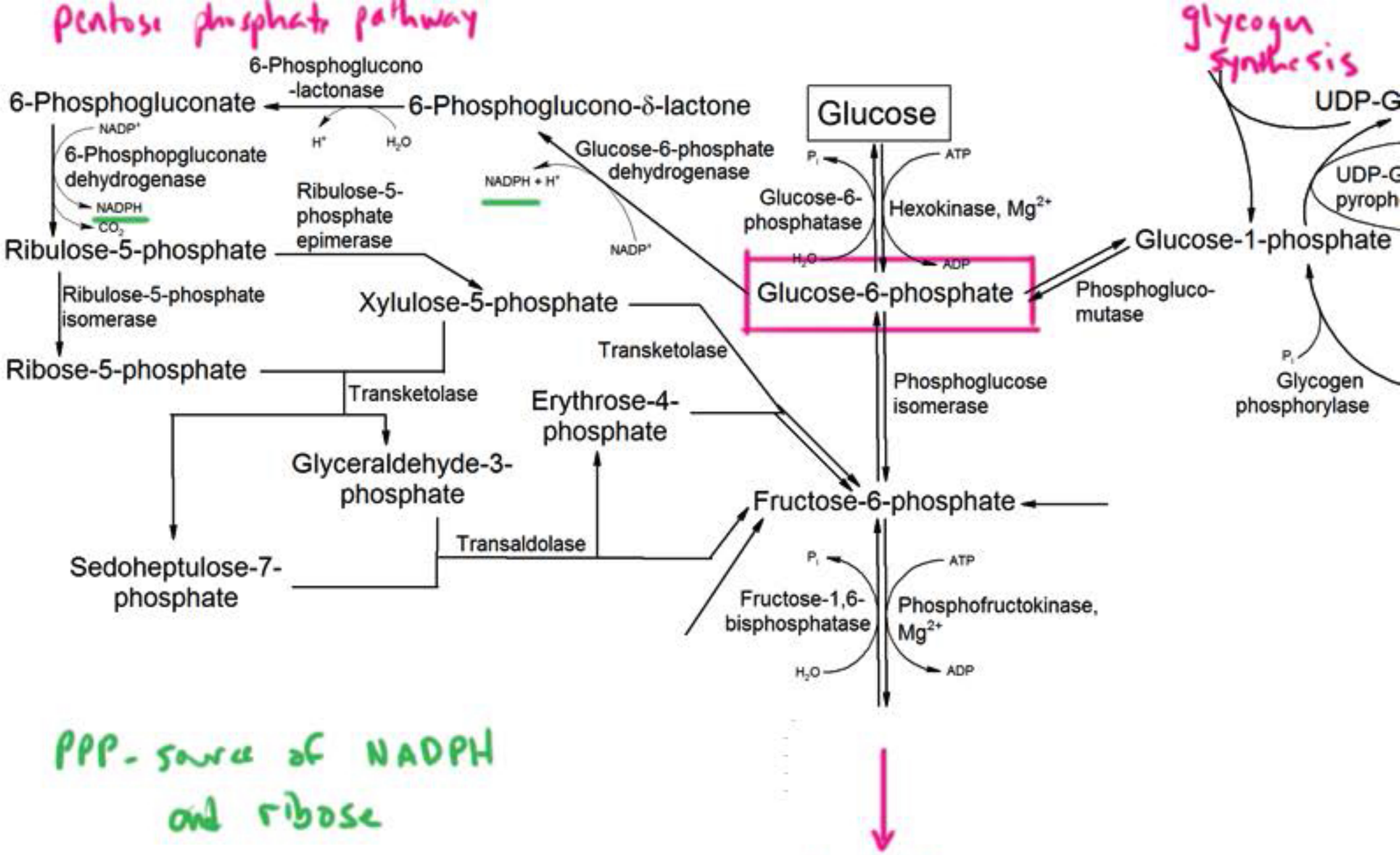
NADPH brings reducing equivalents to biosynthesis



NADP+

primary source is PPP

pentose phosphate pathway



glycogen synthesis

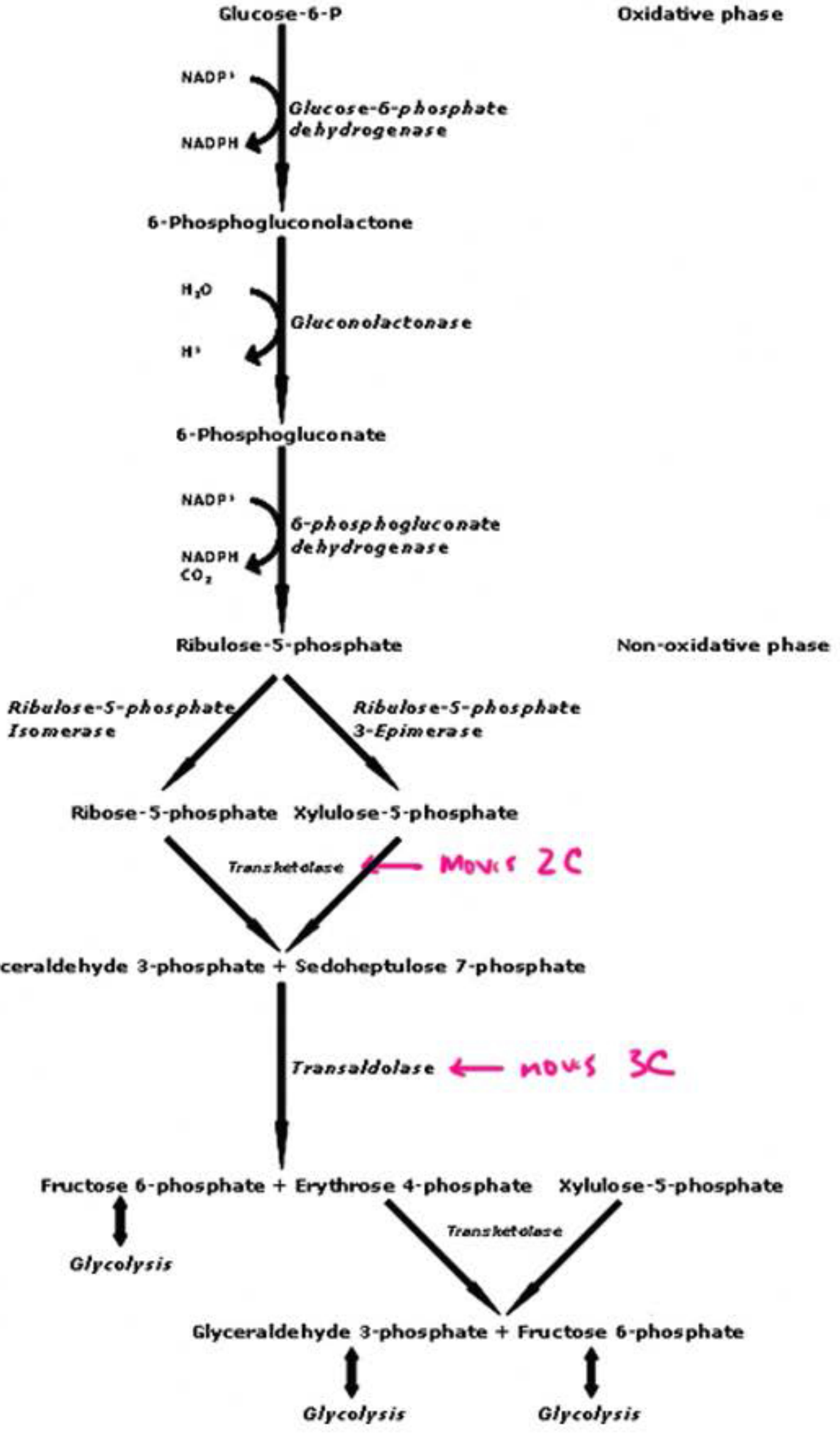
UDP-G

UDP-G
pyroph

PPP - source of NADPH
and ribose

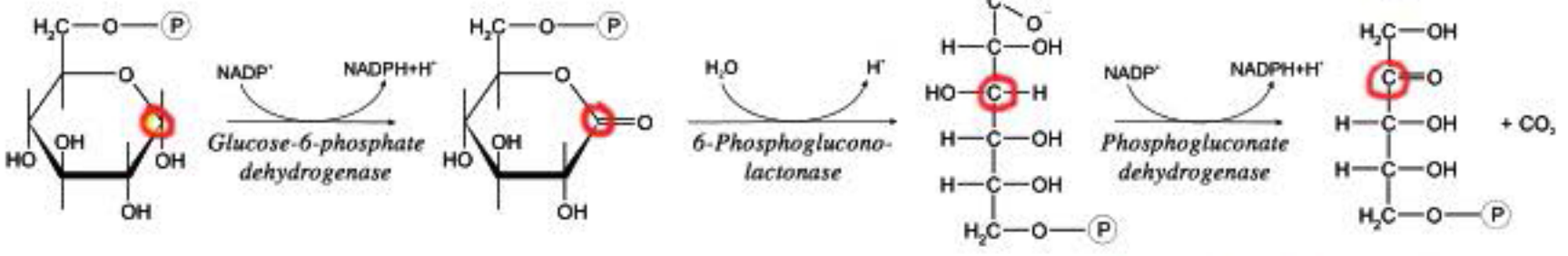
glycolysis

Pentose Phosphate pathway



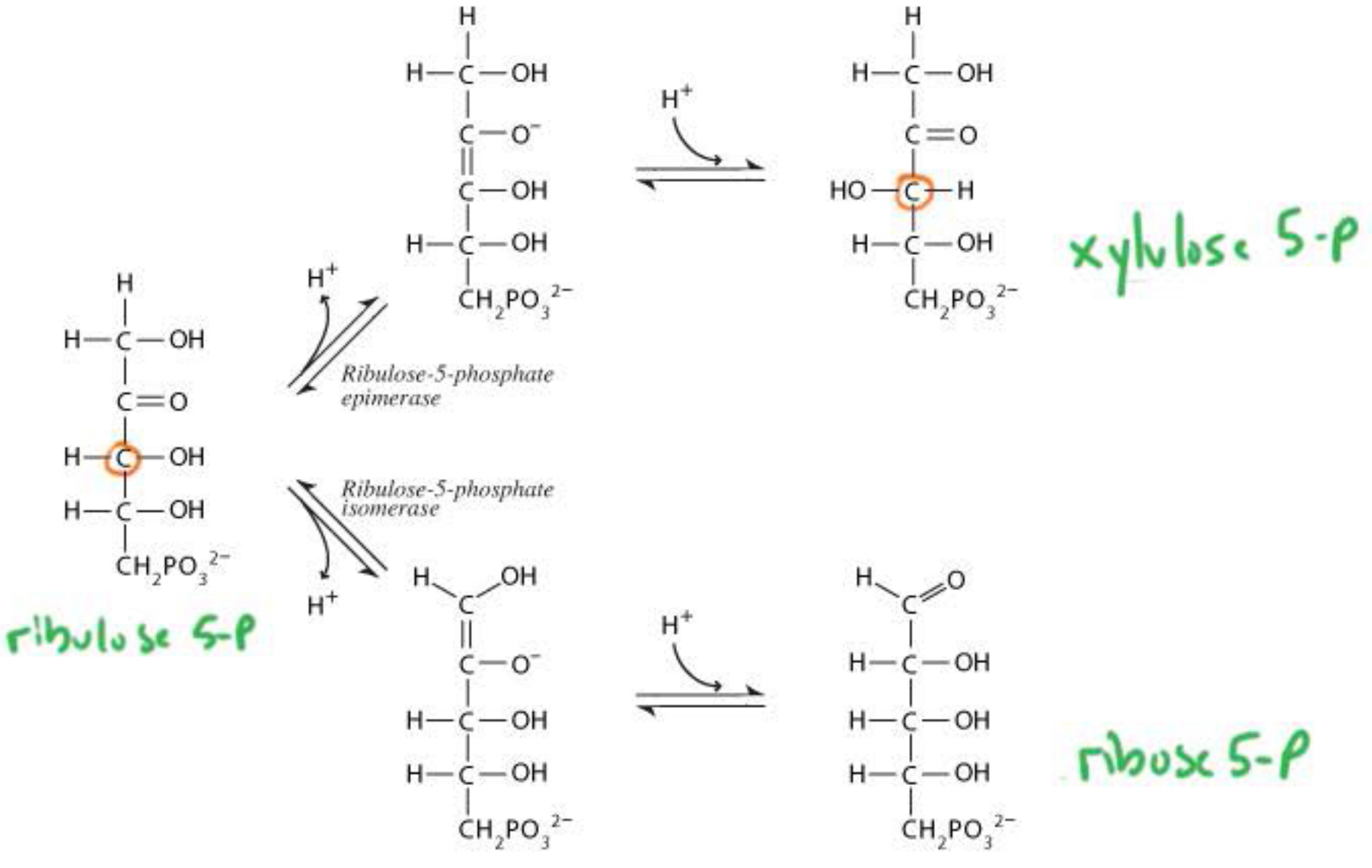
$$3G6P + 6NADP^{+} + 3H_2O \rightleftharpoons 6NADPH + 6H^{+} + 3CO_2 + 2F6P + GAP$$

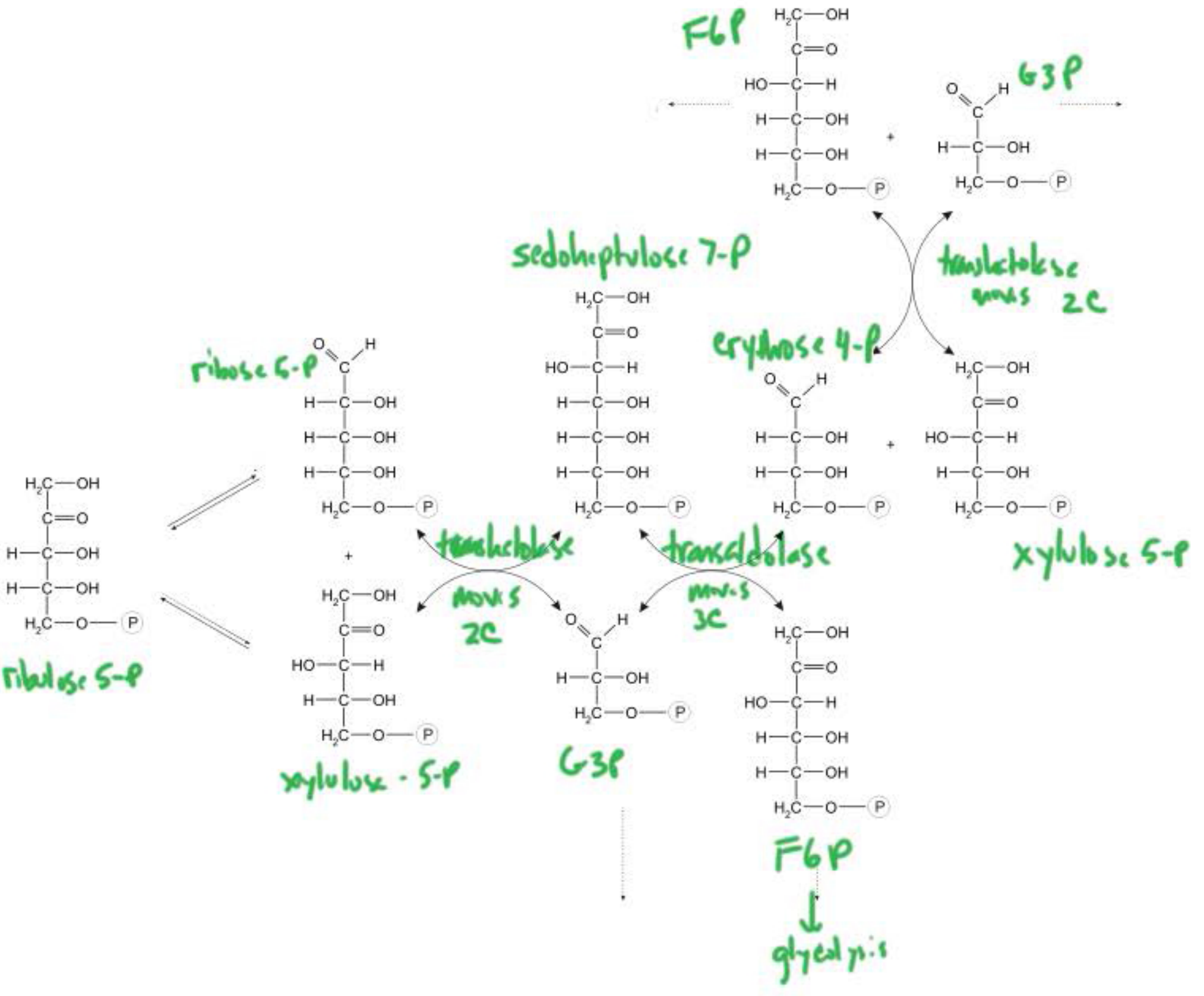
Oxidative portion

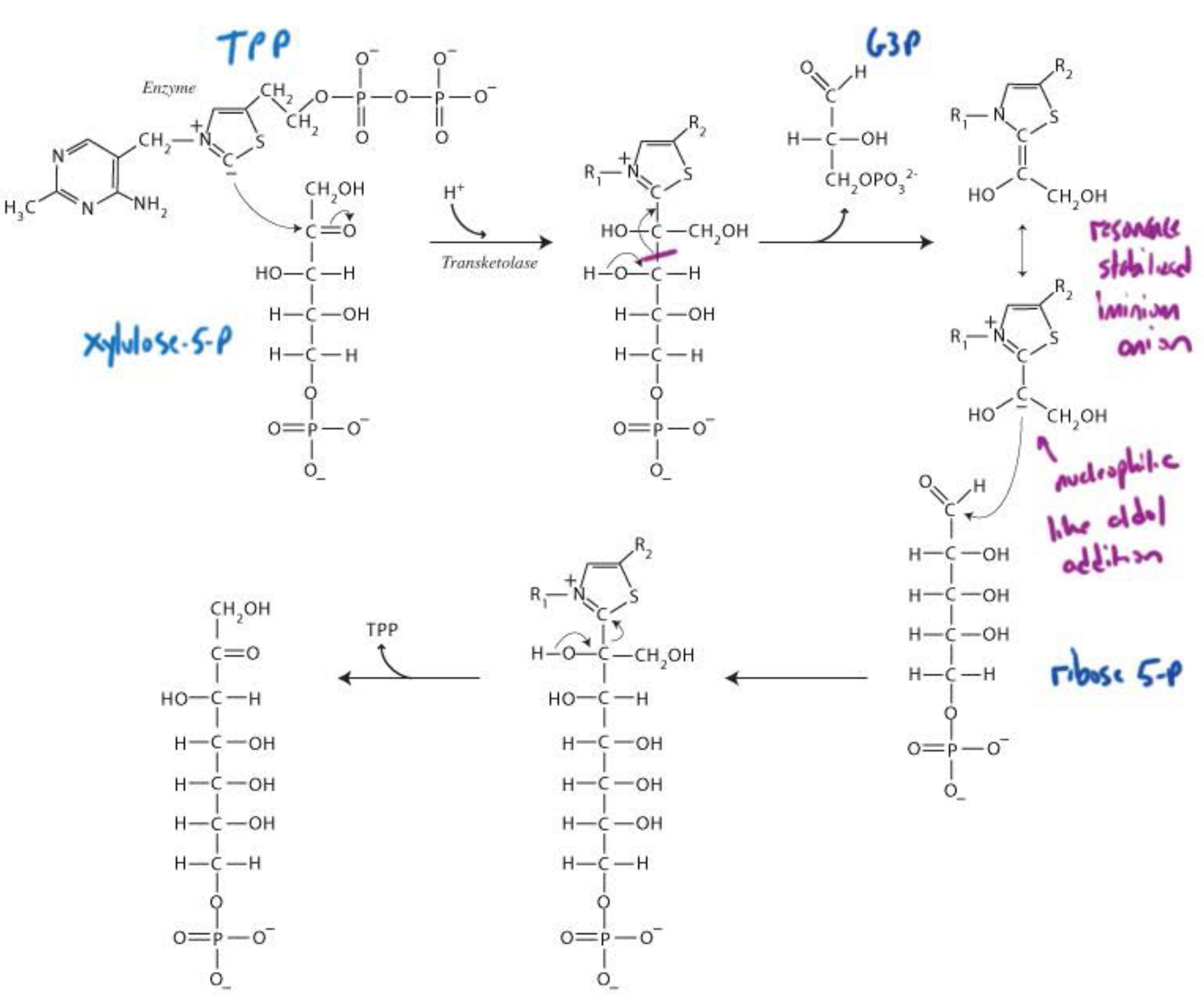


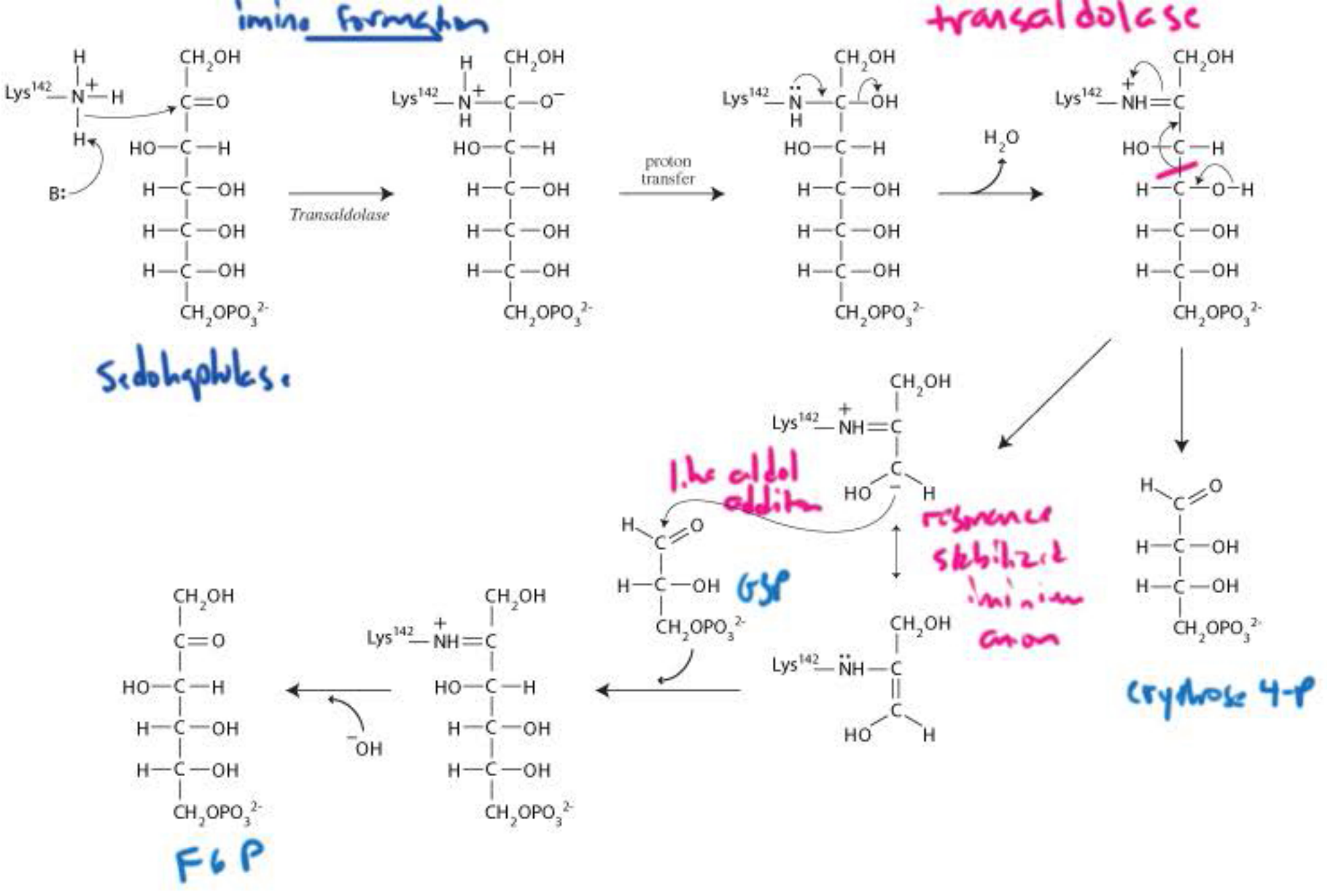
Ribulose 5-P

oxidative Ground
β keto acid
which decarboxylates


Ribulose-5-phosphate epimerase
Ribulose-5-phosphate isomerase
xylulose 5-P
ribulose 5-P
ribose 5-P


F6P
G3P
sedoheptulose 7-P
transketolase
moves 2C
erythrose 4-P
ribose 5-P
transketolase
transaldolase
moves 2C
moves 3C
xylulose 5-P
Ribulose 5-P
xylulose - 5-P
G3P
F6P
glycolysis


TPP
Enzyme
Xylulose-5-P
H+
Transketolase
G3P
resonance stabilized iminium anion
nucleophilic like aldol addition
Ribose 5-P
TPP
Sedoheptulose 7-P


imine formation
transaldolase
Lys142
B:
Transaldolase
proton transfer
H2O
Sedoheptulose
1. the aldol addition
GSP
resonance stabilized imine anion
Erythrose 4-P
F6P
−OH

$$C_5 + C_5 \rightleftharpoons C_7 + C_3$$ transketolase

$$C_7 + C_3 \rightleftharpoons C_6 + C_4$$ transaldolase

$$C_5 + C_4 \rightleftharpoons C_6 + C_3$$ transketolase

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sum $$3C_5 \rightleftharpoons 2C_6 + C_3$$