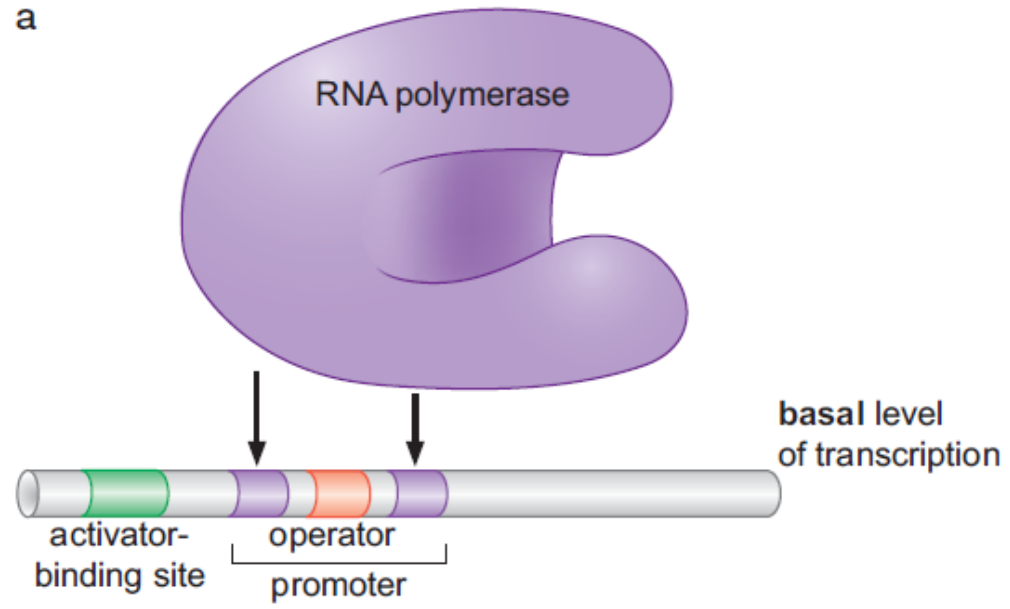


Transcriptional Regulation in Prokaryotes (Operons)

Molecular Biology
Sayan Ganguly
MicroDome
22.04.25

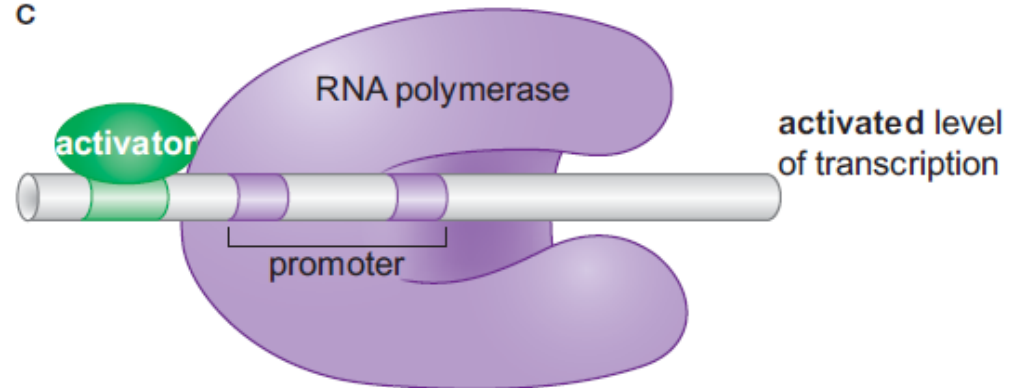
a



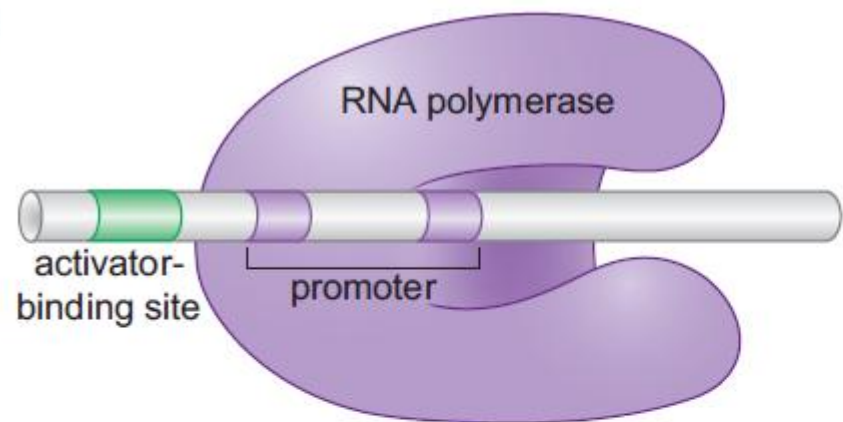
b



c

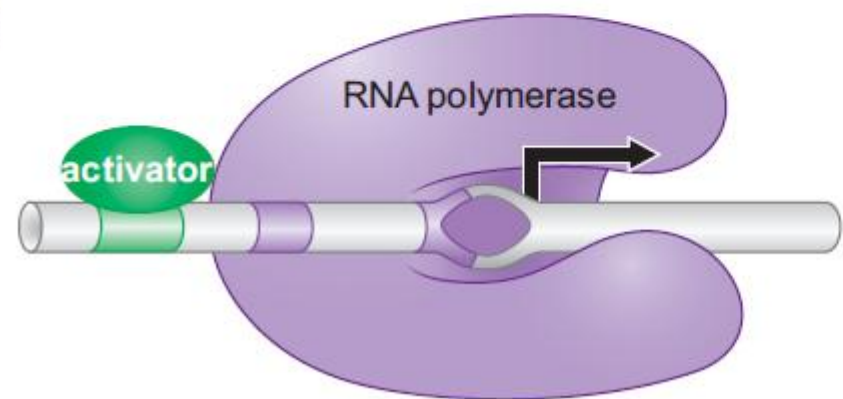


a

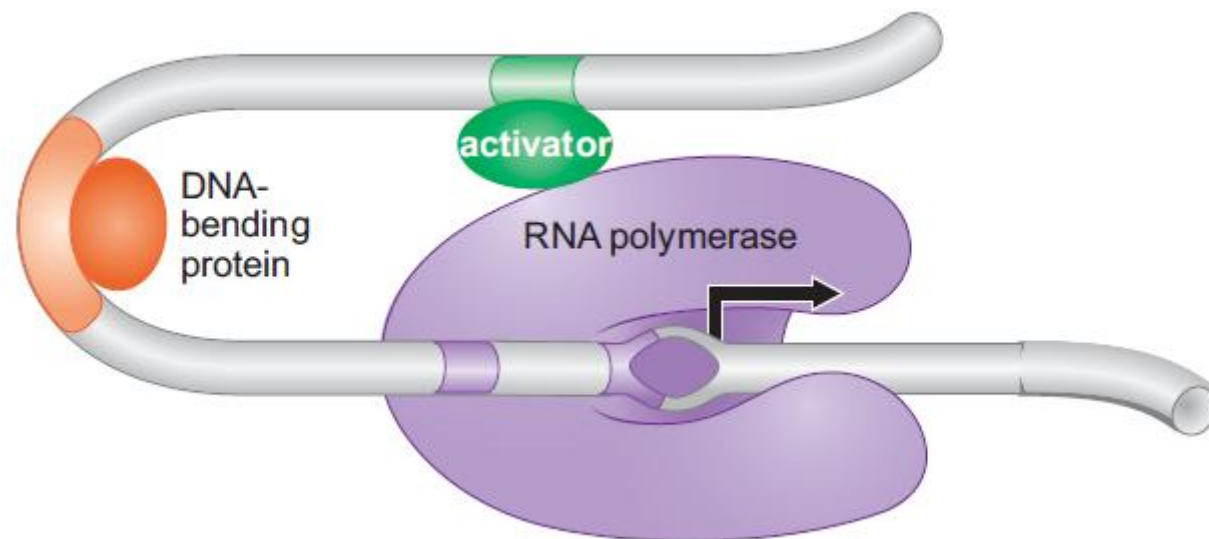


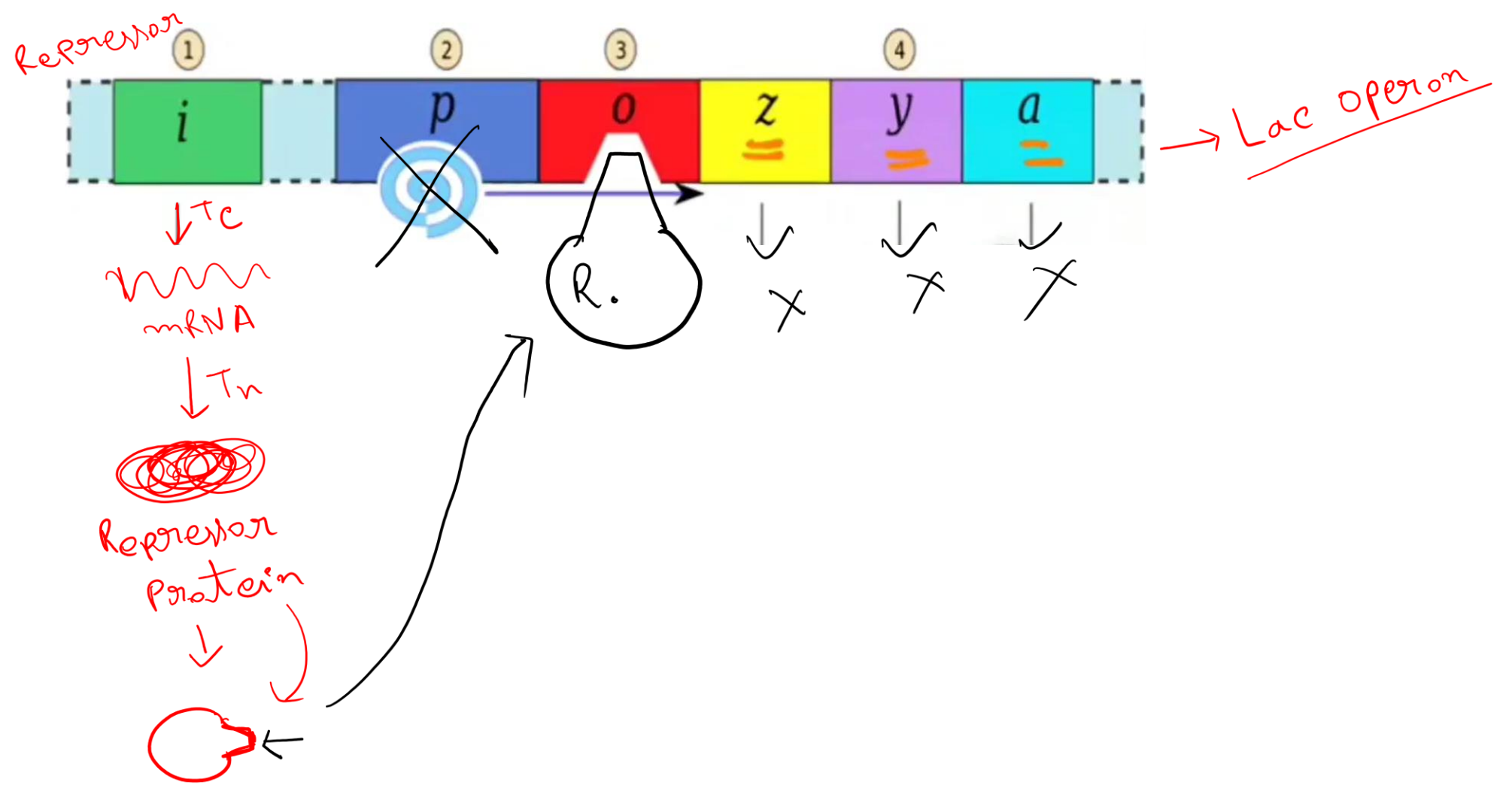
no spontaneous
isomerization and thus
no transcription

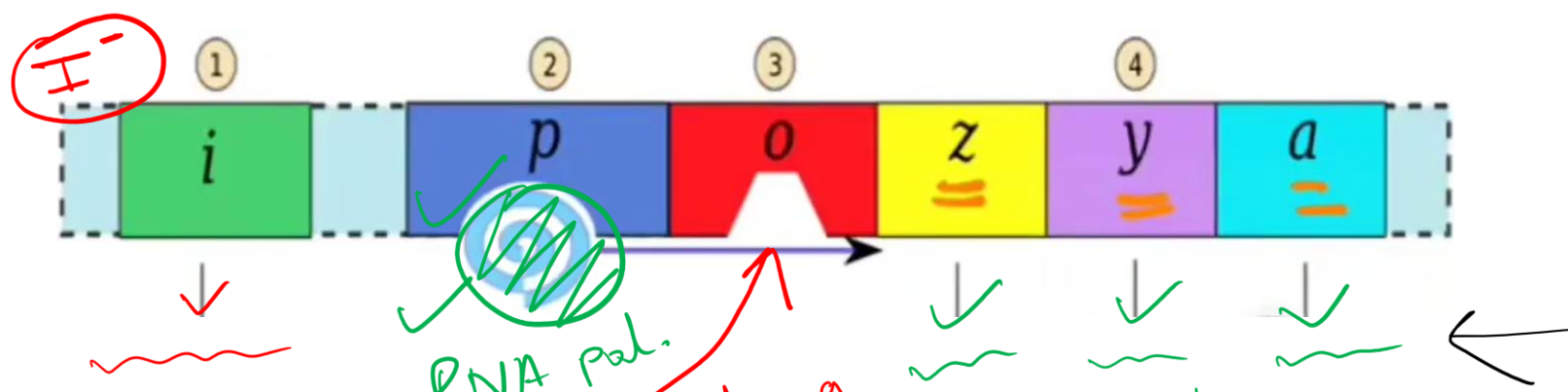
b



activated level
of transcription

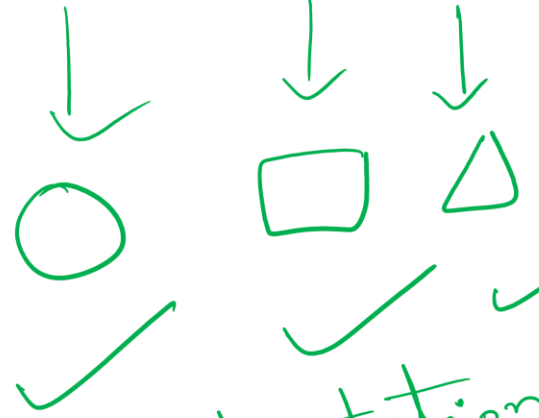






(R.)
mutated
repressor
protein

⊗ No binding

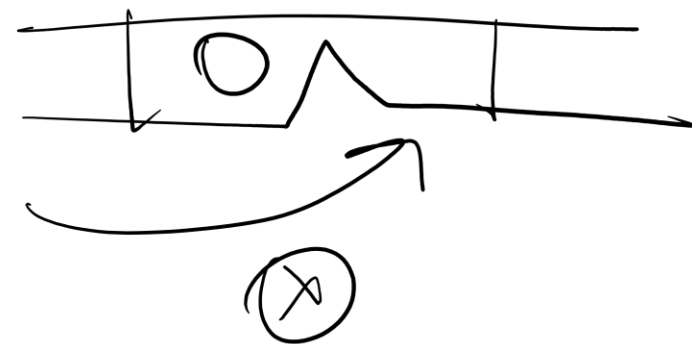


Constitutational expression
Continuous

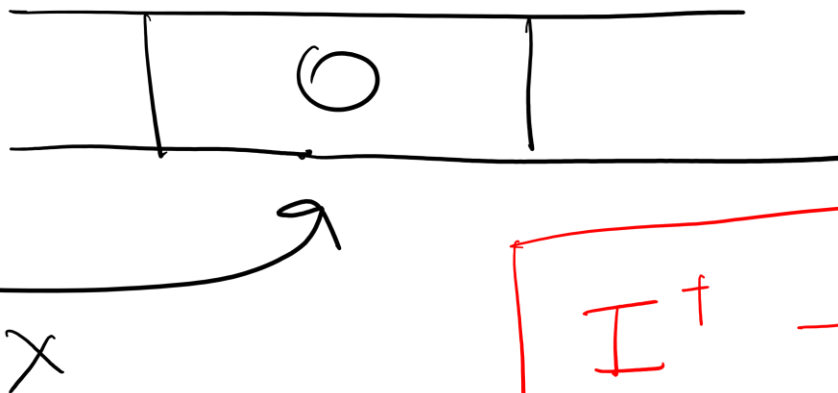
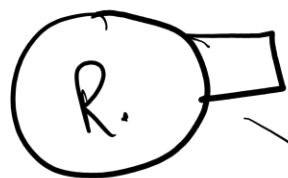
Operator = Const. mutated

↓
[it doesn't have
repressor binding site]

② R.

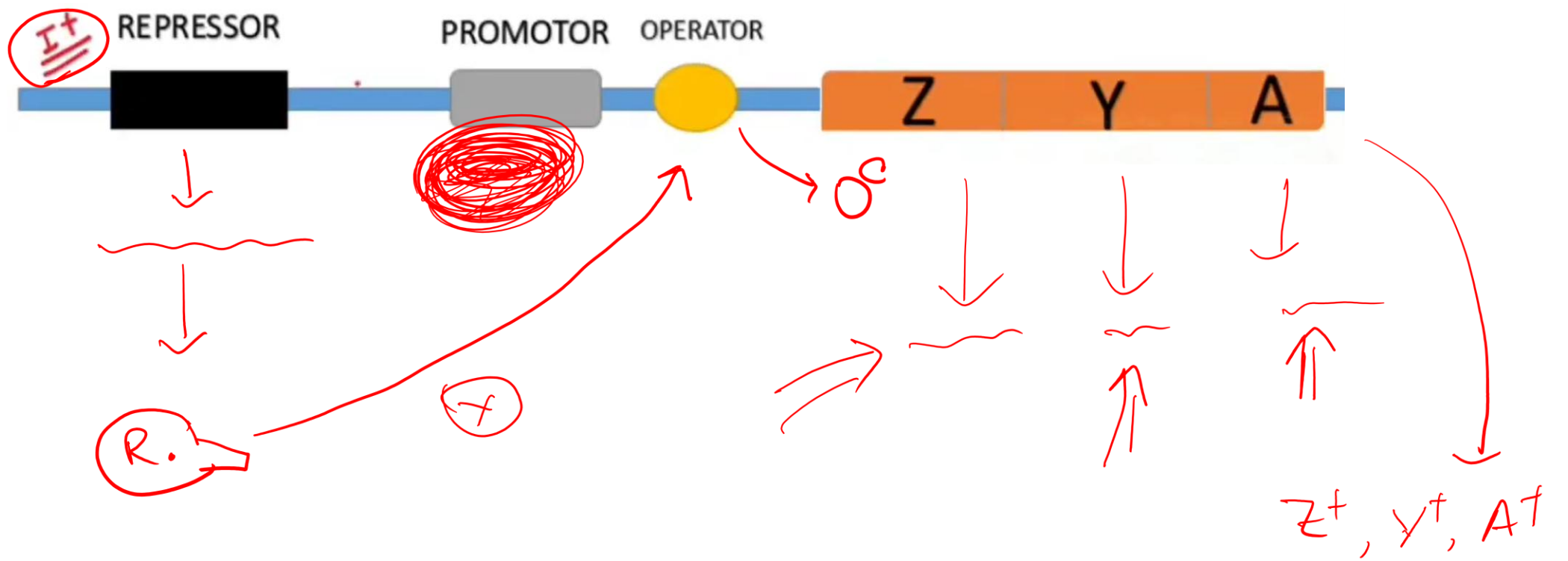


①



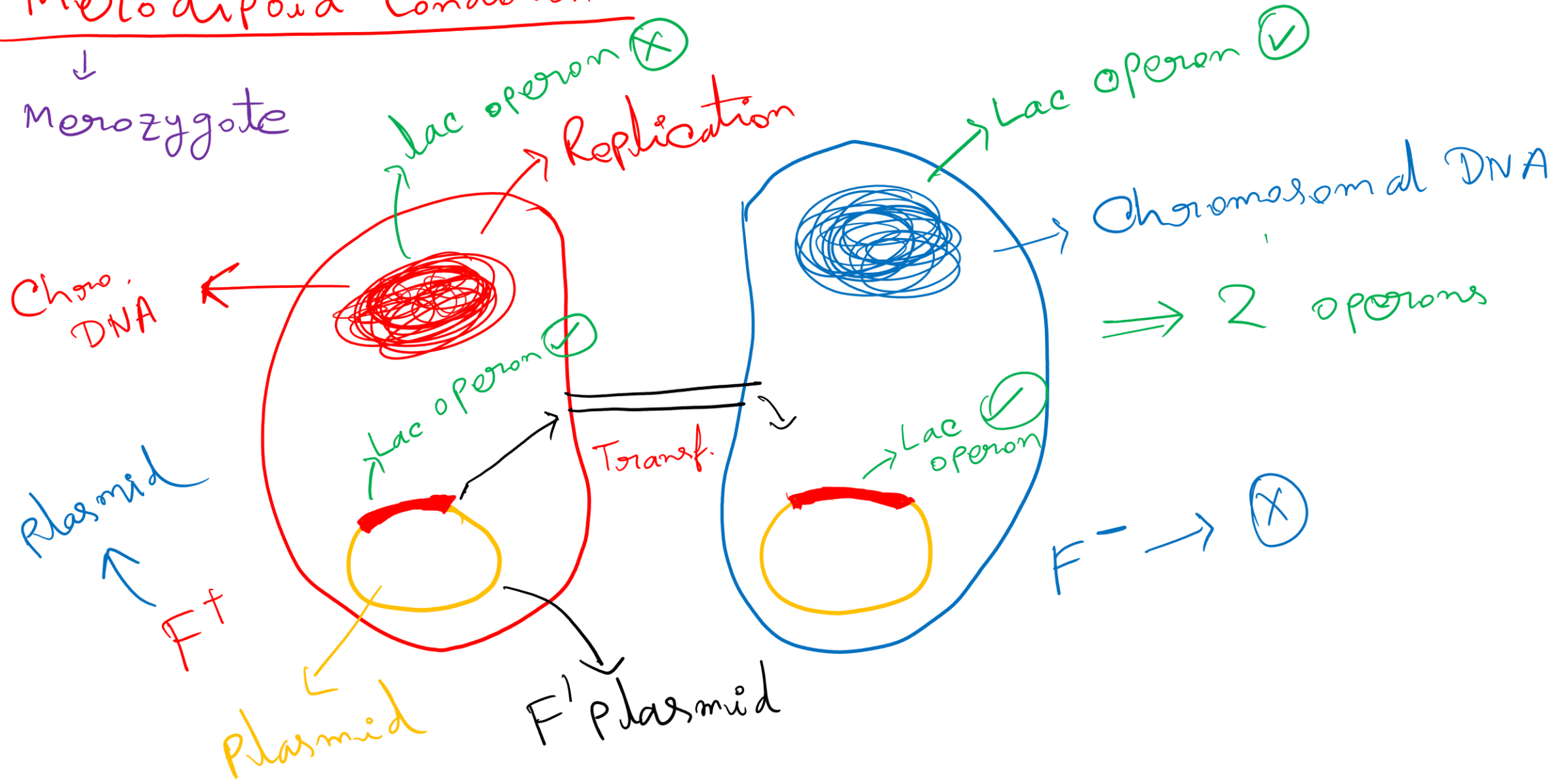
$O^c \rightarrow$ Constitutive
exp.

I^+ \rightarrow wild type
(no mutation)
 I^- \rightarrow mutated

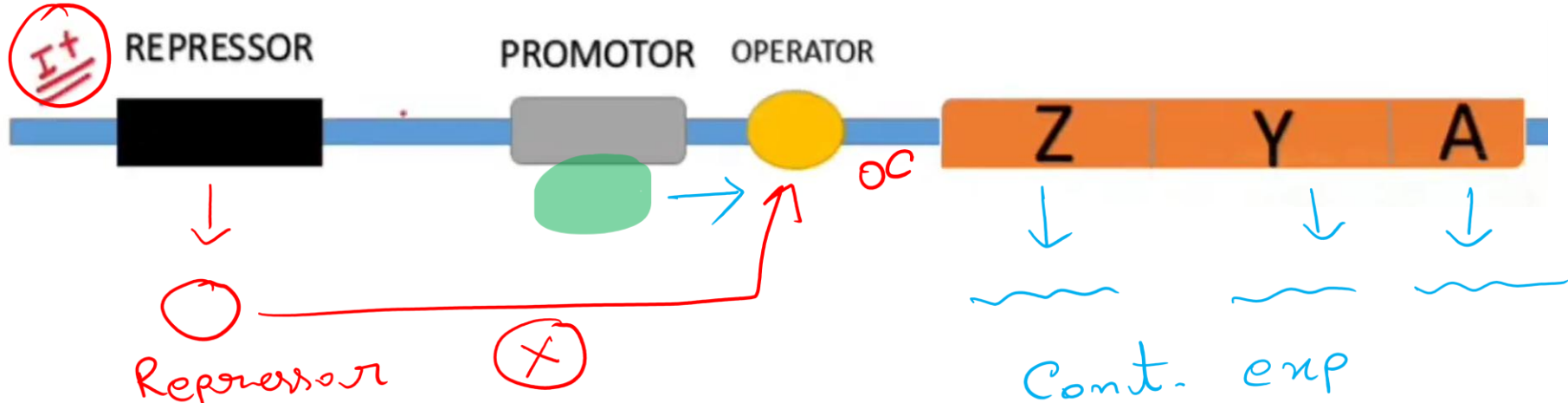


Mero diploid condition

↓
Merozygote



Chromosome
operon

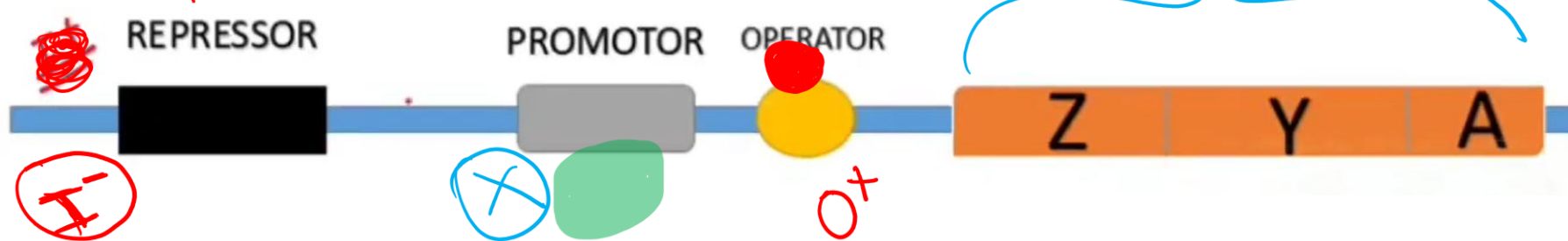


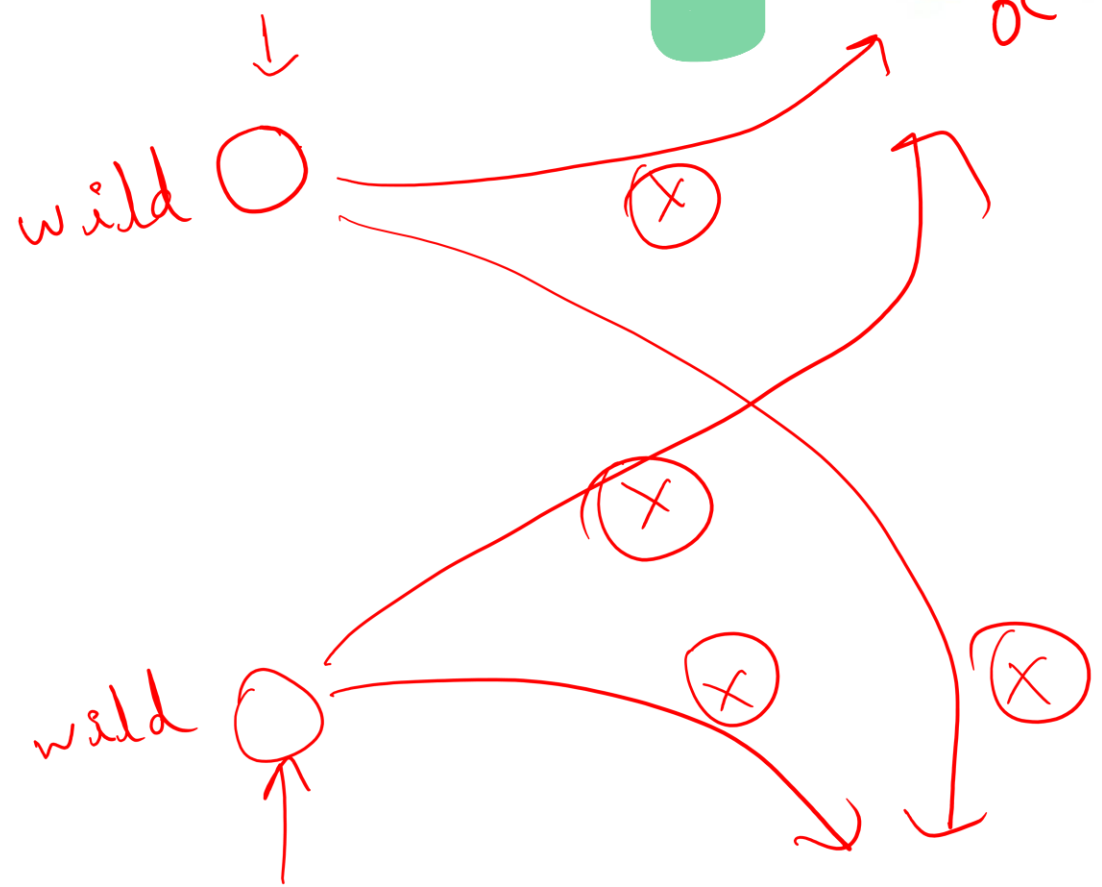
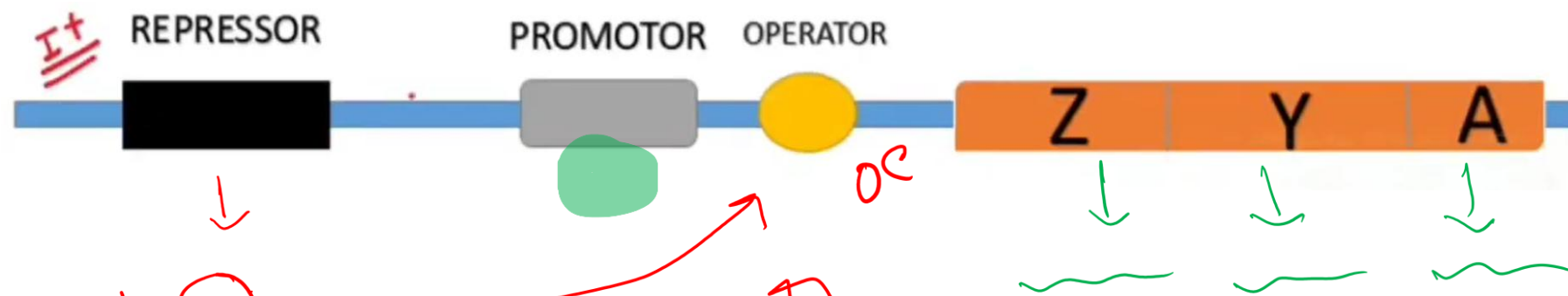
mutated

bind

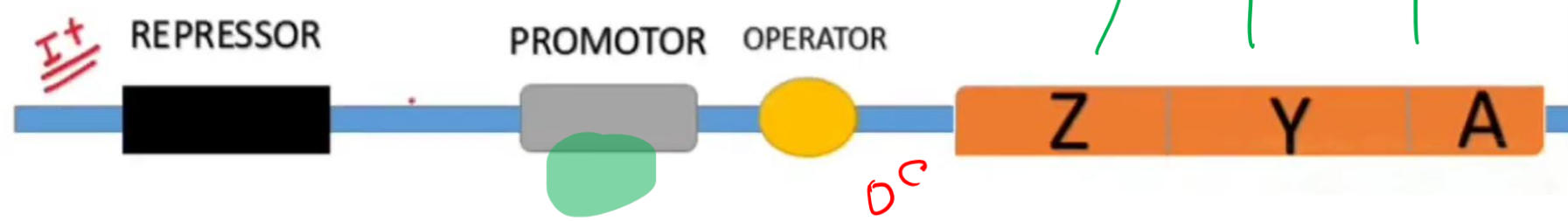
Repress (No. exp)

Plasmid
operon





Const. exp / Inductive exp.
Inducible exp.



Genotypes

with I (Lactose)

w/o I

Phenotype

$O^+ I^+ Z^+$

✓

✗

Inducer

Inducible

mut.
↑
 $O^- I^+ Z^+$

✓

✓


Cont.

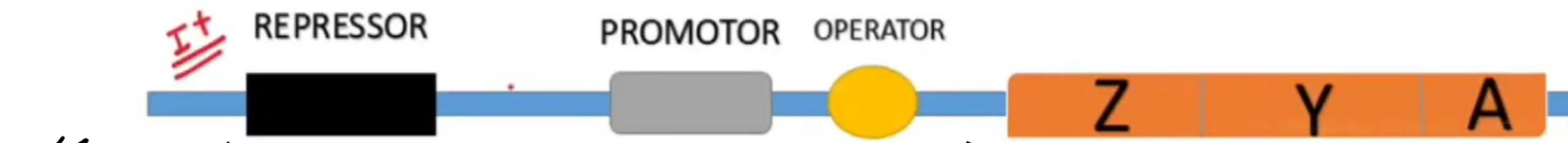
$O^+ I^- Z^+$
mutated

✓

✓

Cont.

Genotypes	with I	w/o I 	Phenotype
$I^- O^+ Z^+ / I^+ O^+ Z^+$	✓	⊖ ✗	Inducible
$I^+ O^c Z^+ / I^+ O^+ Z^+$?	?	?
$I^+ O^c Z^+ / I^- O^+ Z^-$?	?	?
$I^- O^+ Z^+ / I^- O^+ Z^+$?	?	?
$I^+ O^c Z^+ / I^+ O^c Z^+$?	?	?



mut.



wild



PROMOTOR OPERATOR

PROMOTOR OPERATOR

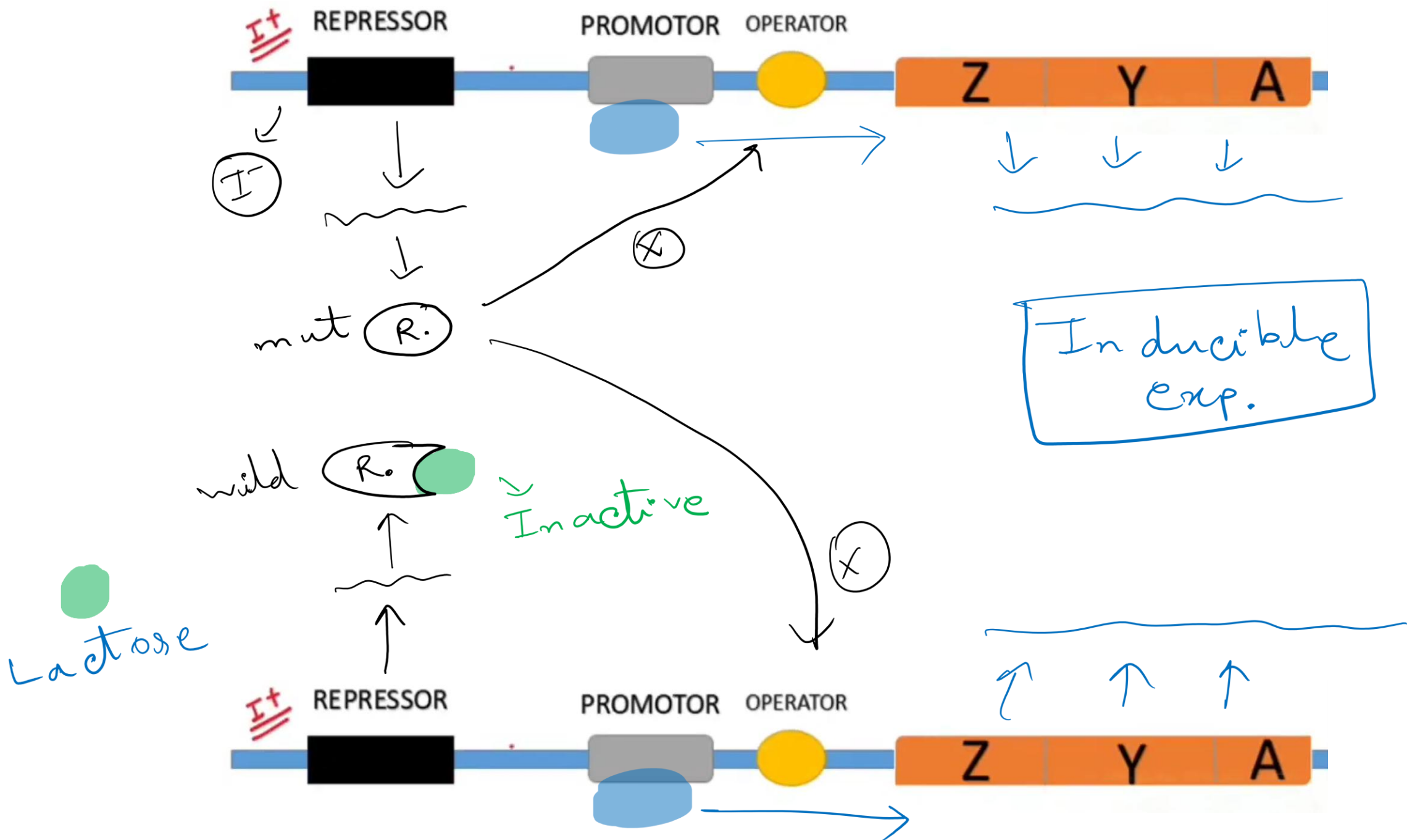
O⁺

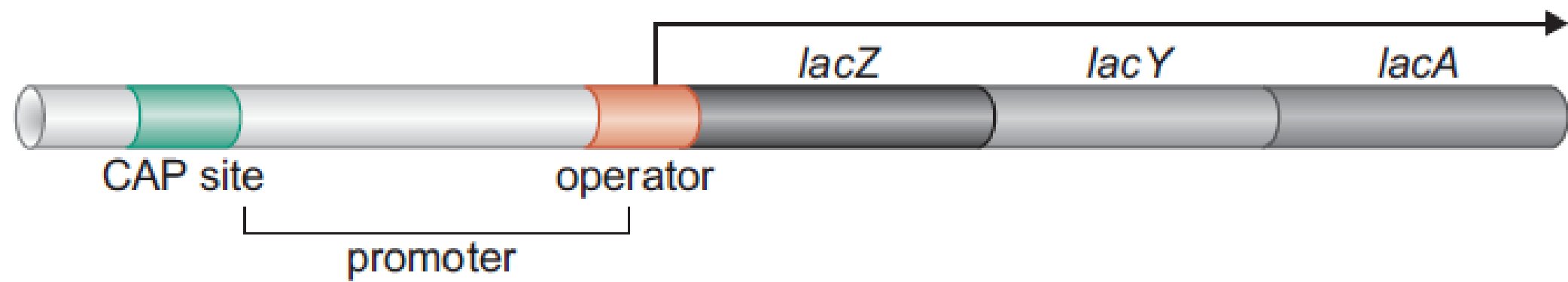
O⁺

No exp.

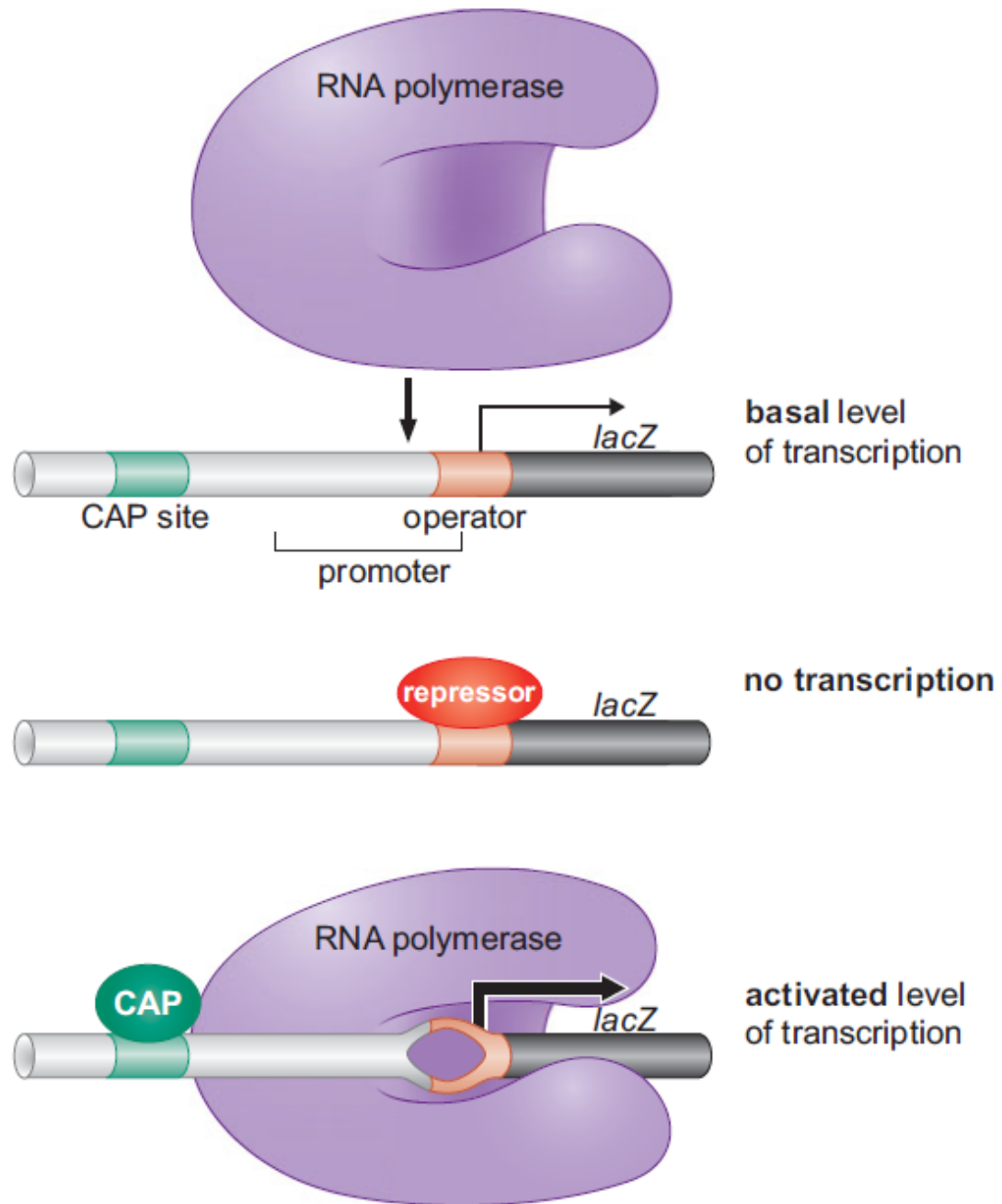
w/o lactose

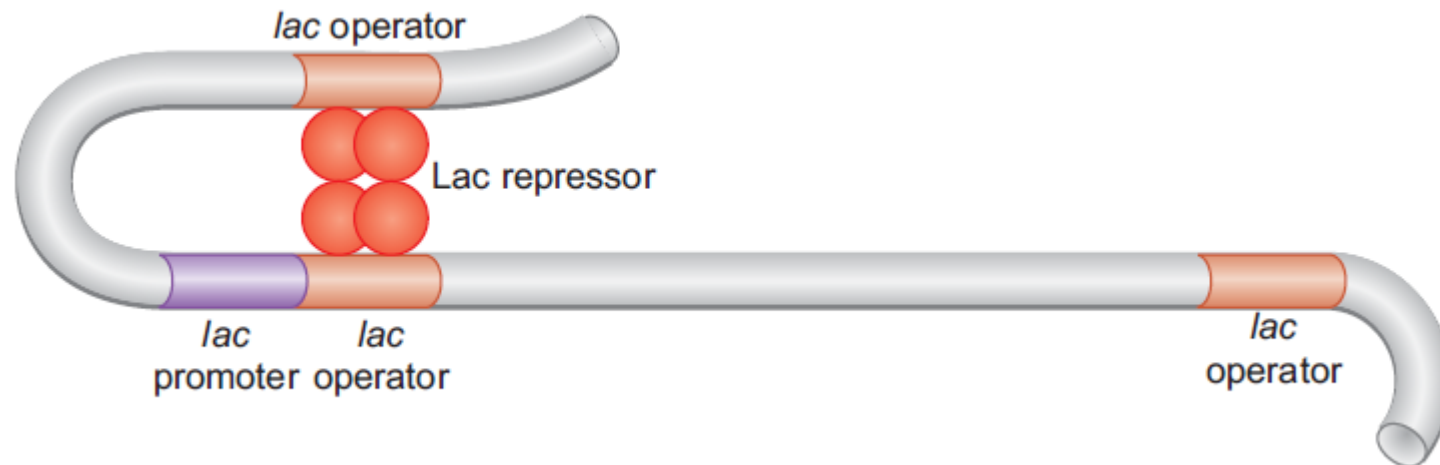
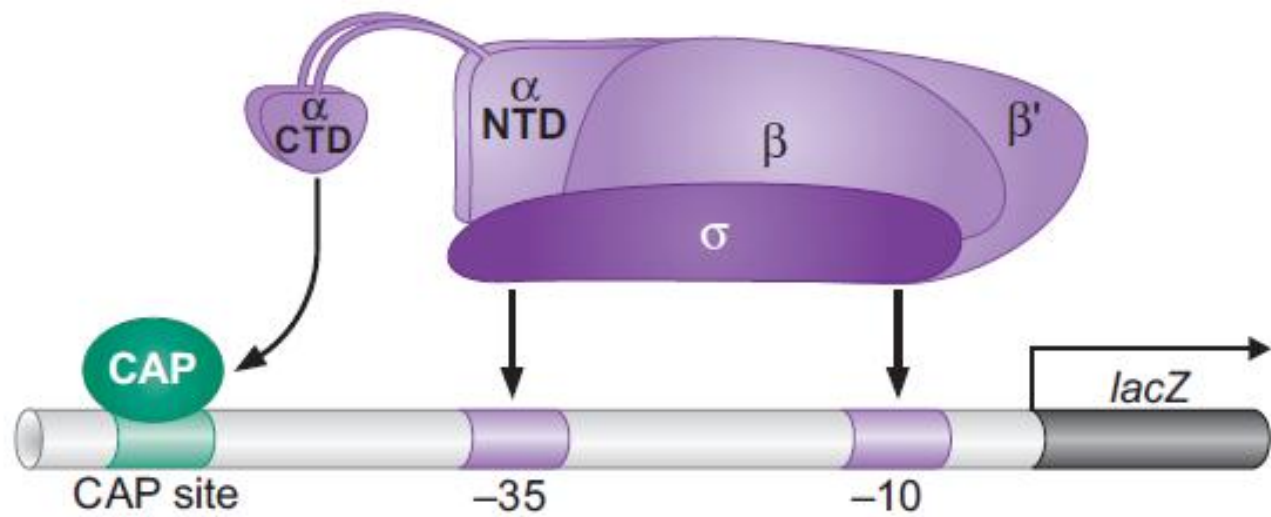
No. exp

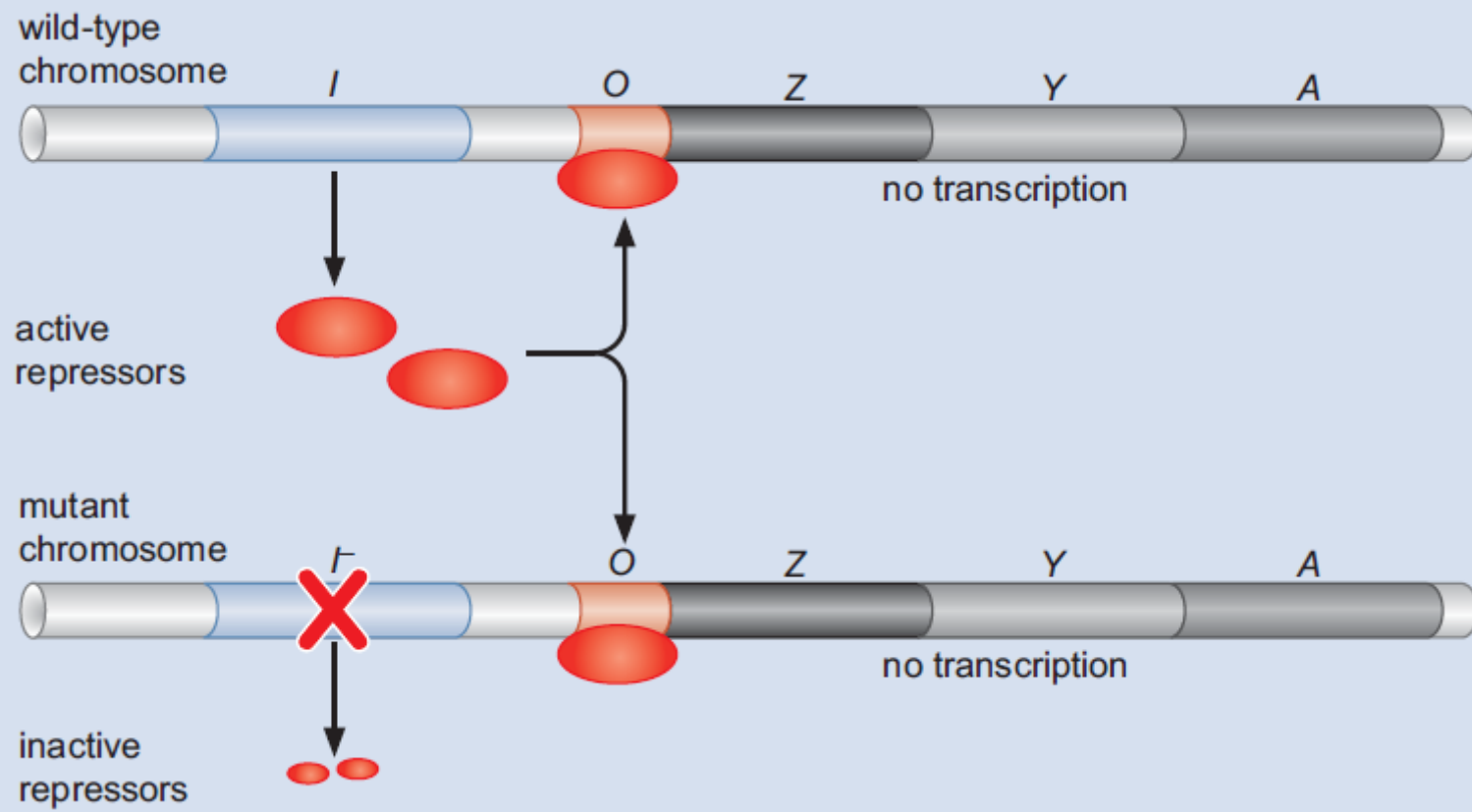




glucose	lactose
+	+
+	-
-	+

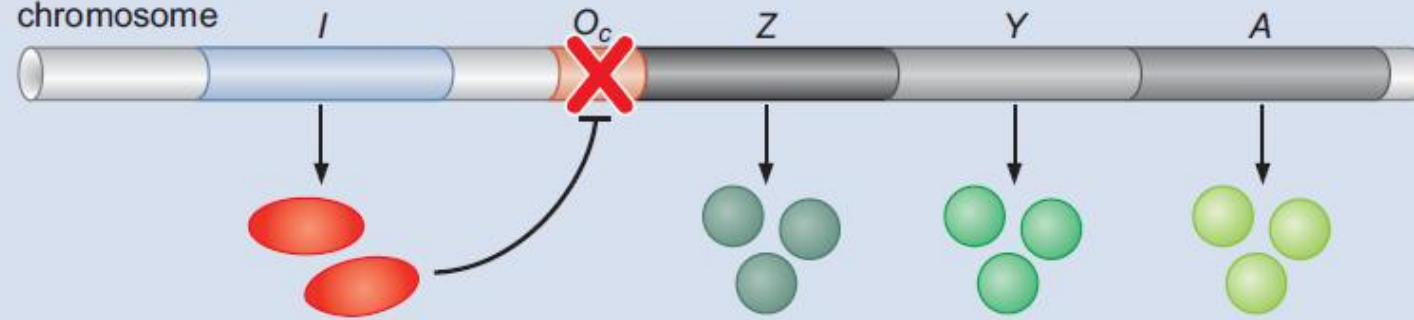






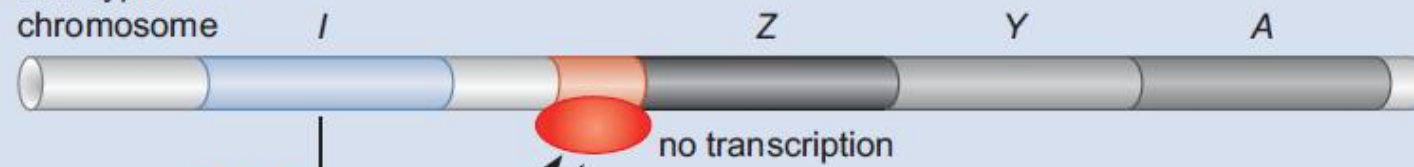
a

mutant
chromosome

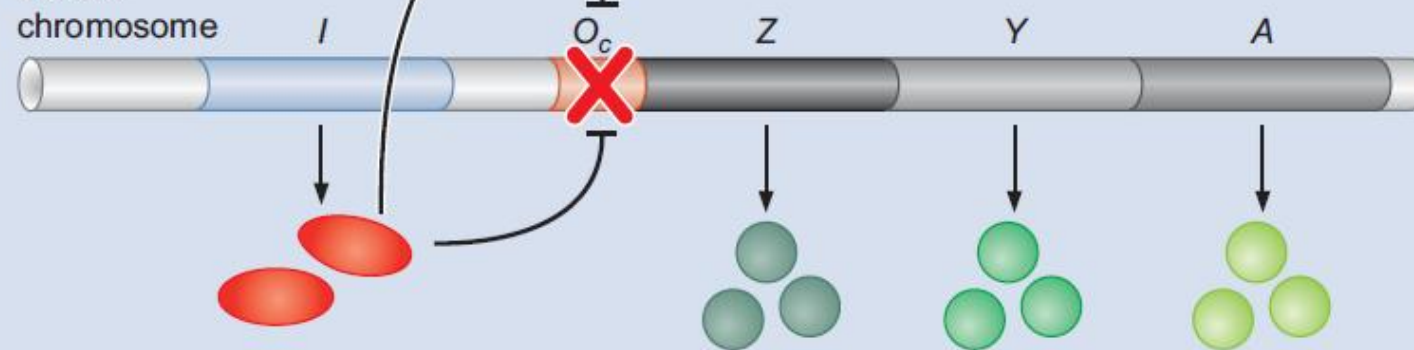


b

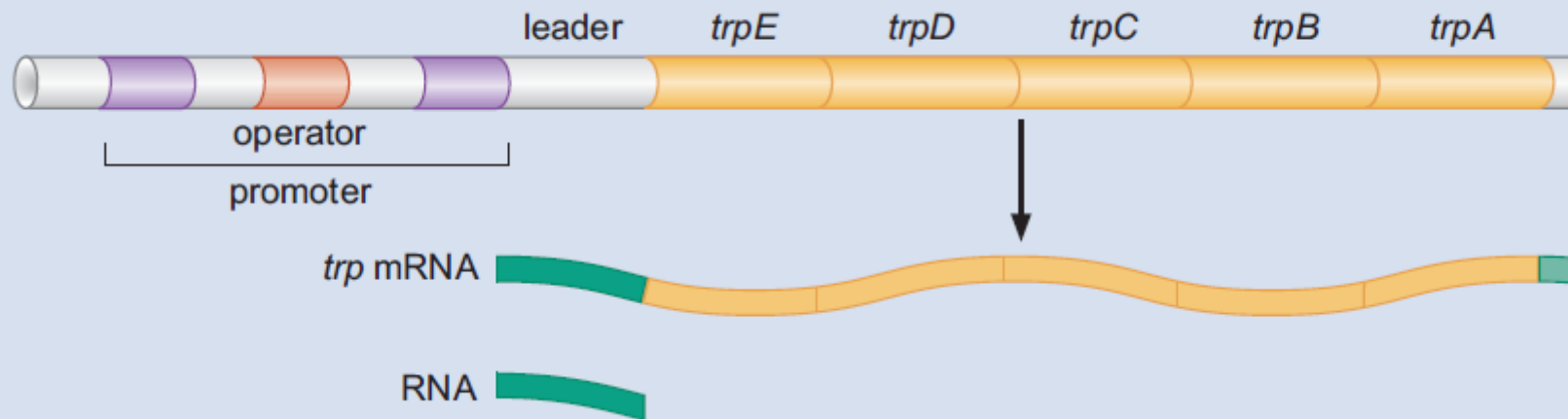
wild-type
chromosome

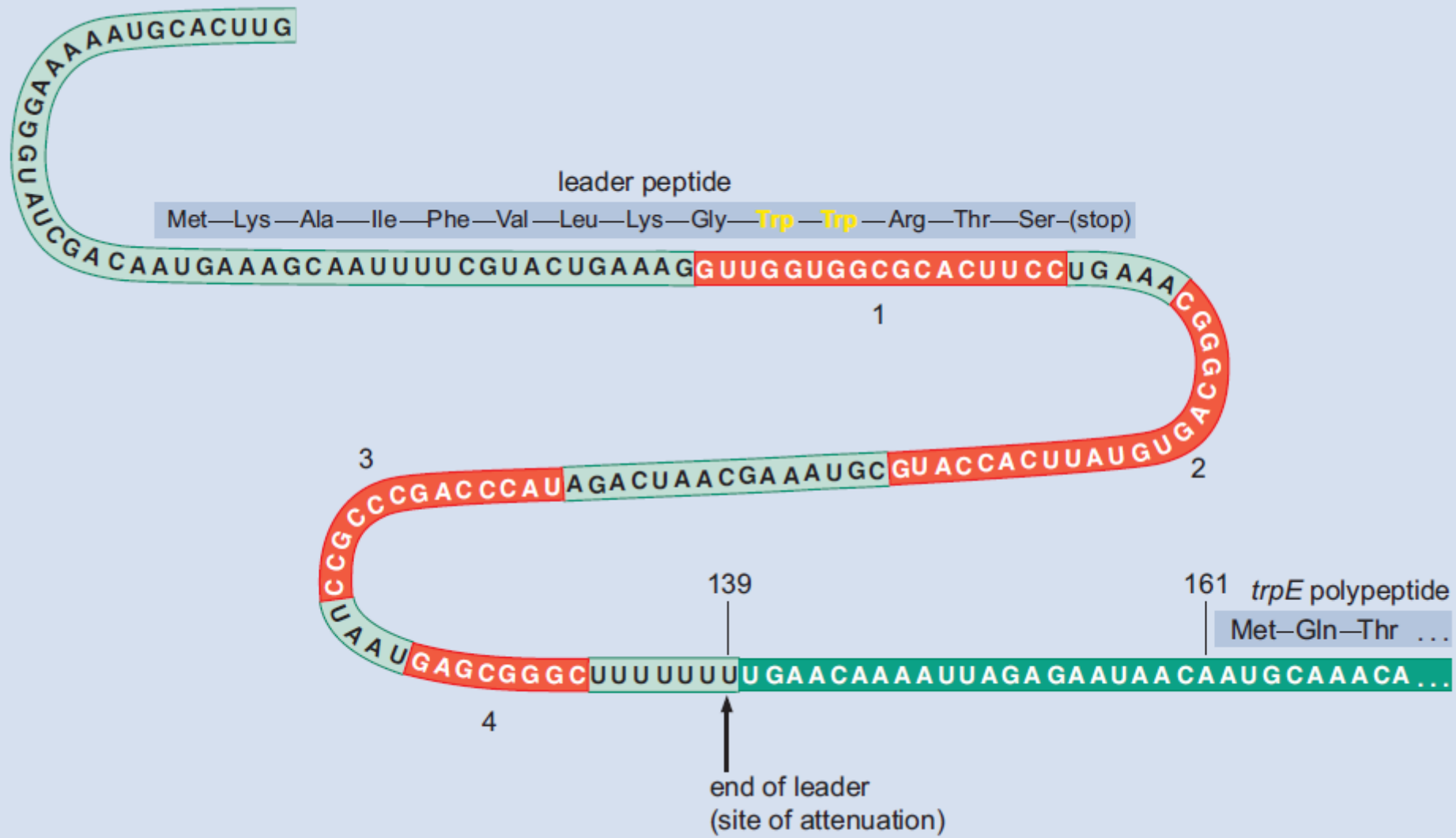


mutant
chromosome

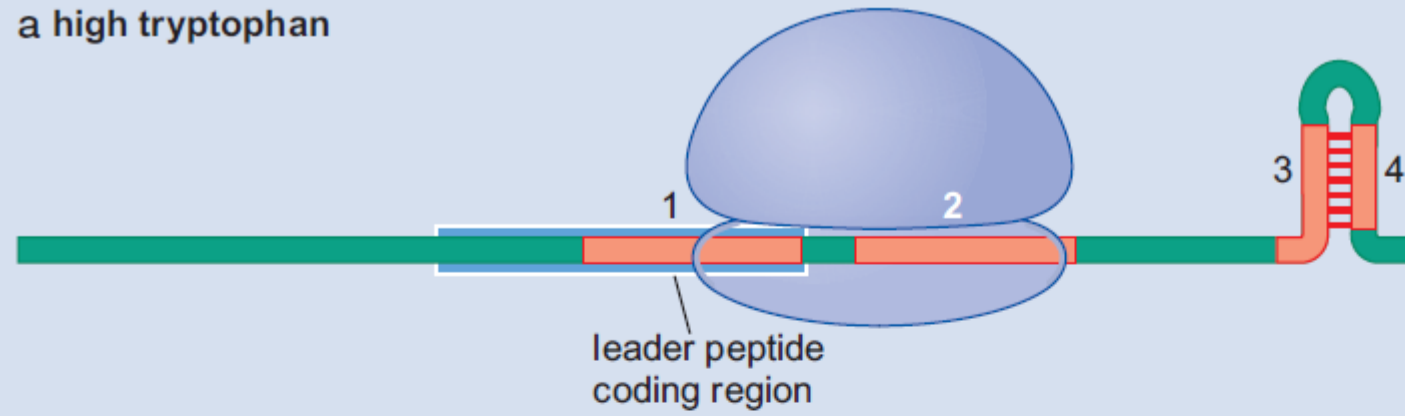


Tryptophan (Trp) Operon

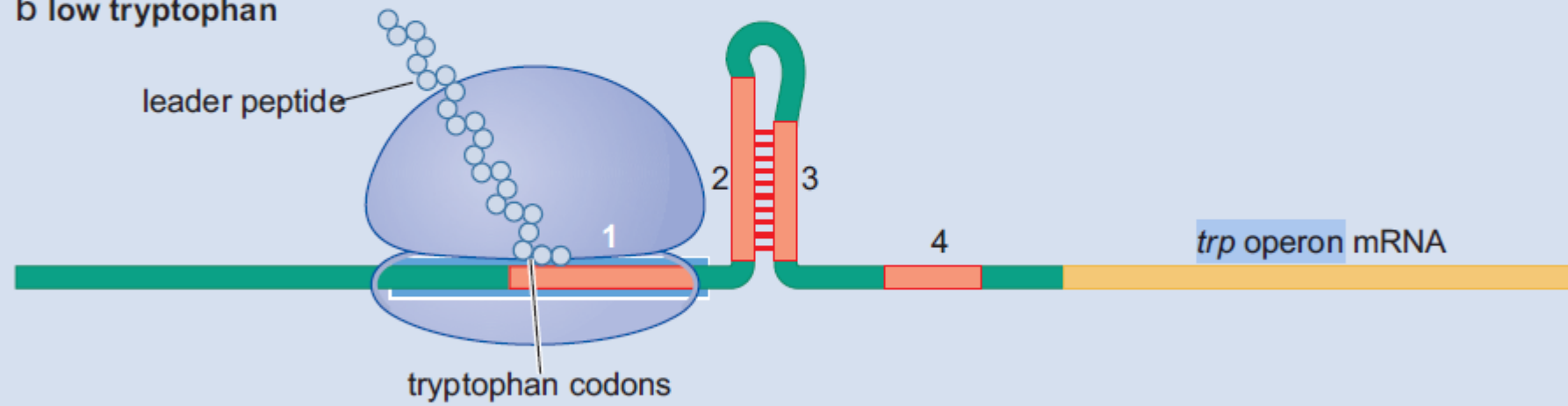




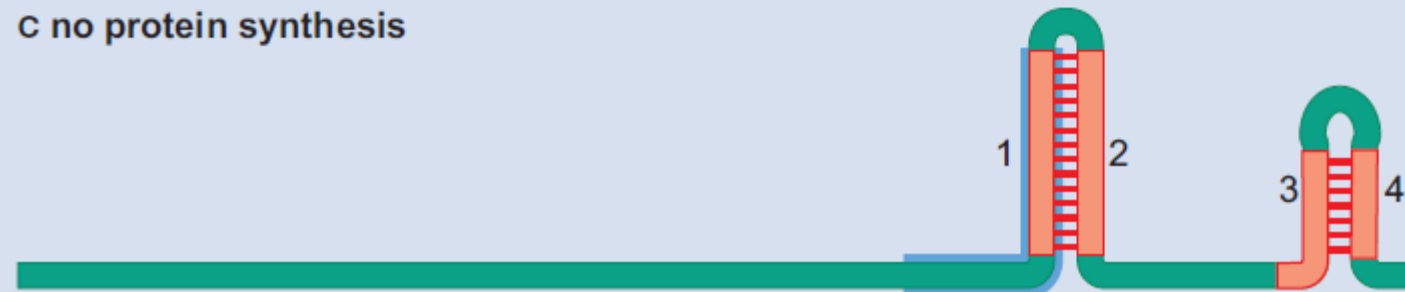
a high tryptophan



b low tryptophan



c no protein synthesis



Thank You!