

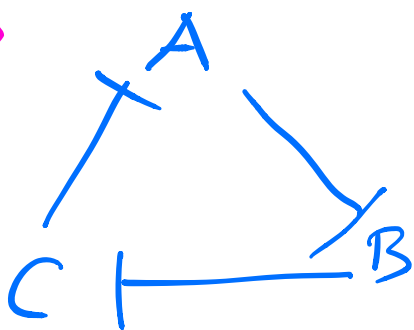
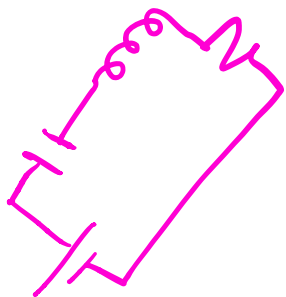
ELL 707

13.01.2000

biomolecular

What generates these γ oscillations?

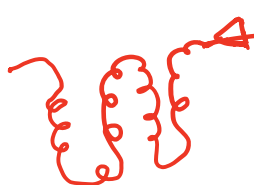
Ex: Repressilator



A, B, C are proteins

- ↳ variables like
 - position, velocity
 - voltage, current
- units are in concentration / number

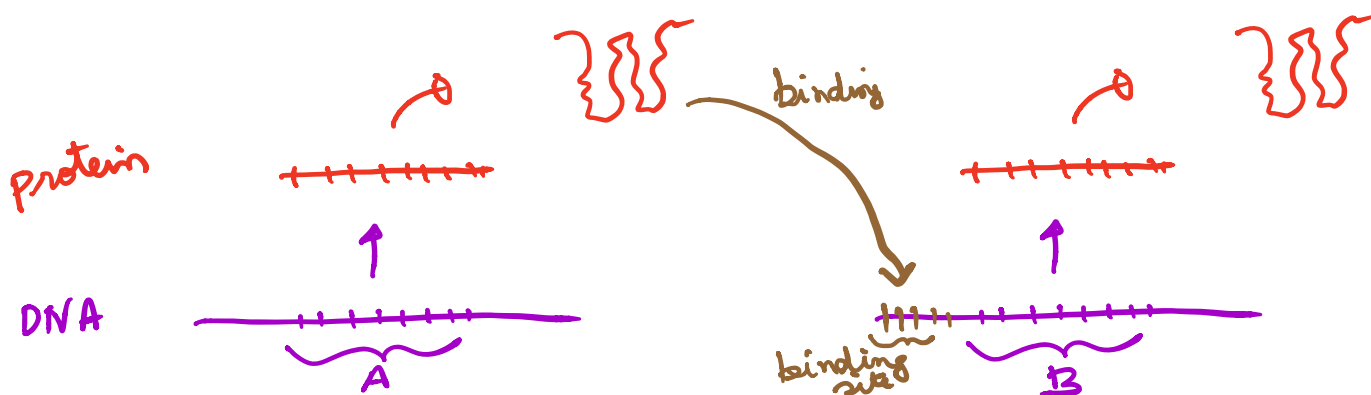
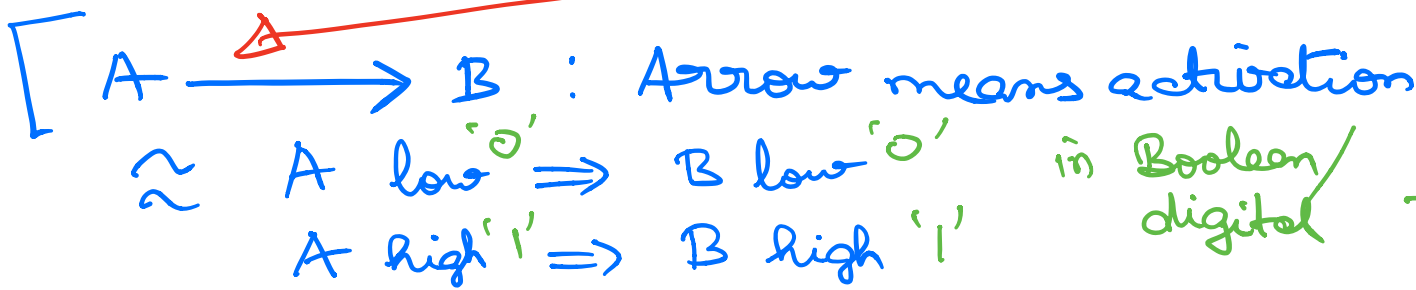
Further characterized by structure, sequence, (and function)



20 amino acids

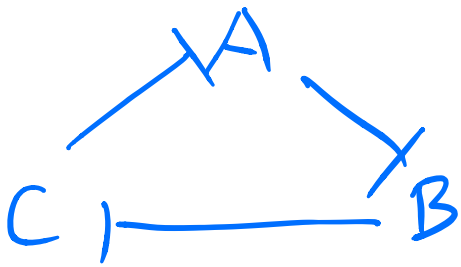
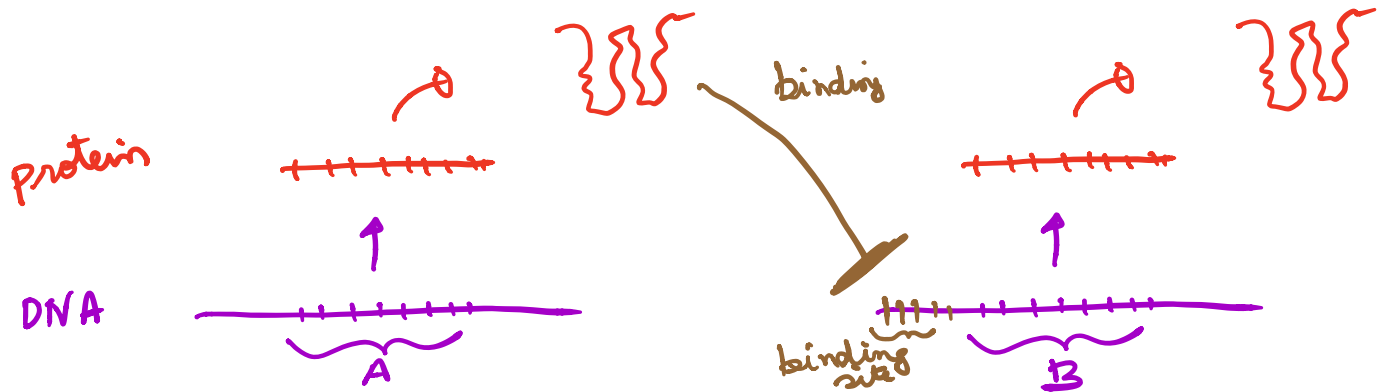
NEVX...

DNA (4 nucleotides)
ATCGTAC...



[$A \longrightarrow B$: (Blunt) arrow means repression
negative activation
inhibition

$\hat{=} A \text{ low '0'} \Rightarrow B \text{ high '1'}$
 $A \text{ high '1'} \Rightarrow B \text{ low '0'}$]

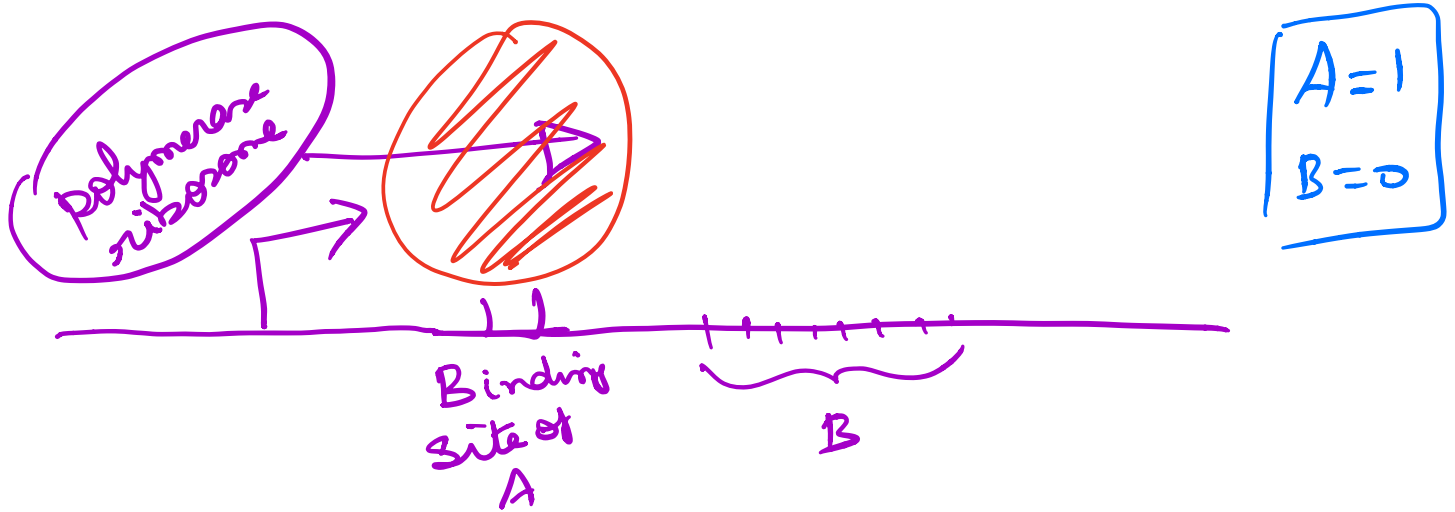
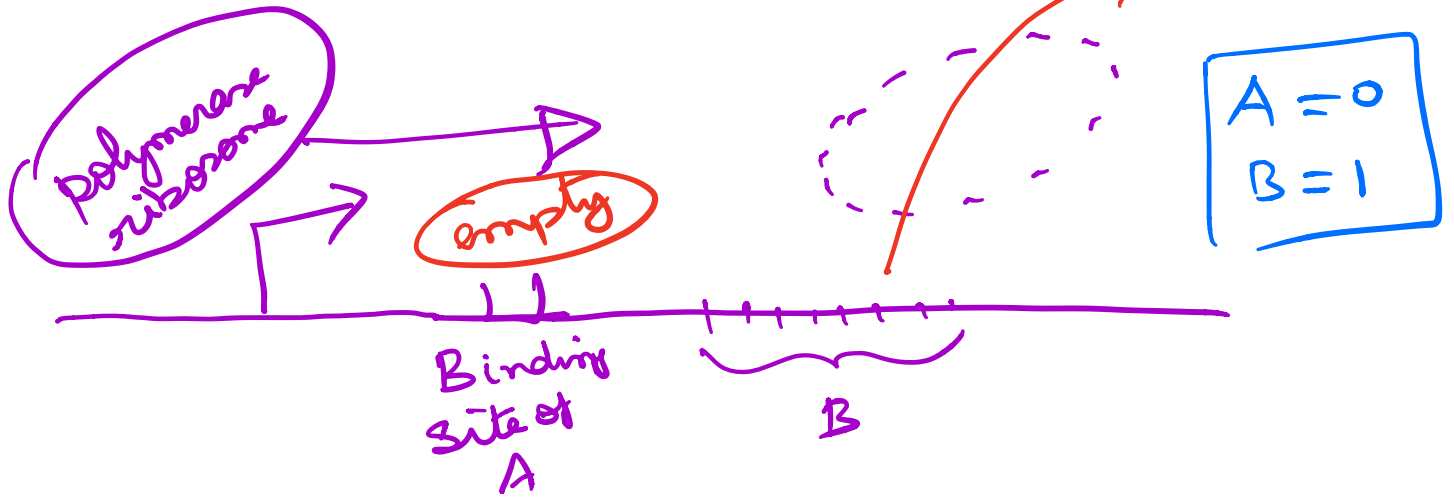


"Ring oscillators"
 for ex: 3 NOT
 gates in a ring
 \Rightarrow oscillation.

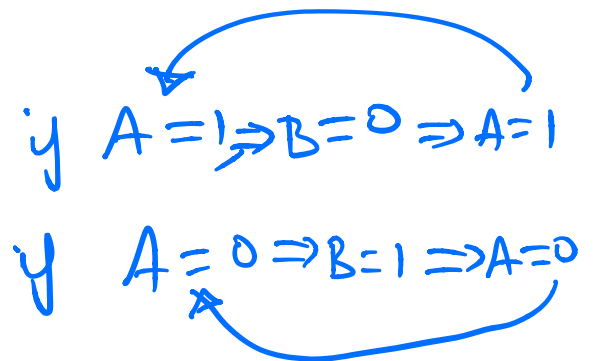
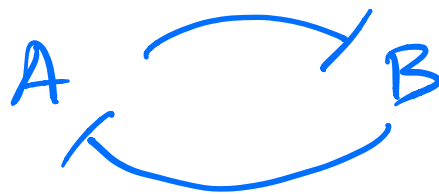
(Boolean / digital)

if A is 0 \Rightarrow B is 1
 \Rightarrow C is 0
 \Rightarrow A is 1
 \Rightarrow B is 0
 \Rightarrow C is 1
 \Rightarrow A = 0

$A = 1 \Rightarrow B = 0 \quad \checkmark$
 $A = 0 \Rightarrow B = 1 \quad ?$



Suppose we had



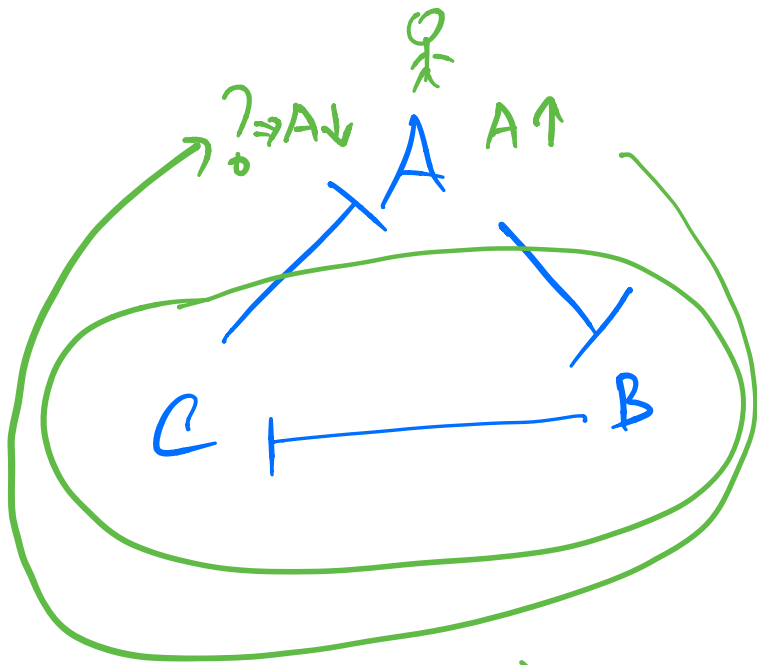
no oscillations,
but two "stable states"

whereas



had "no stable states"
only an oscillation

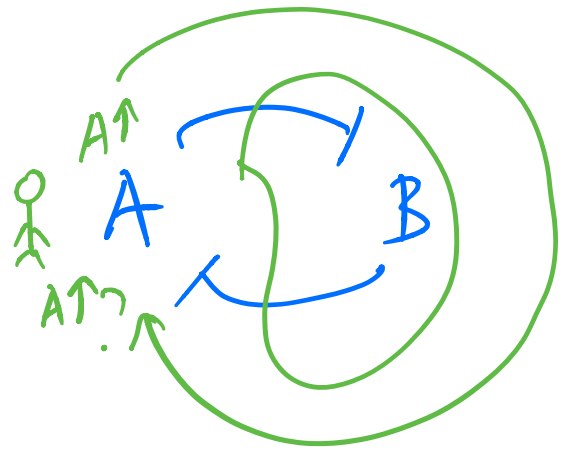
Feedback ?



(Negative)

⇒ may give oscillations

vs



(Positive)

⇒ may give multiple states

Read project paper

for the circuit in it.

What interactions in it?