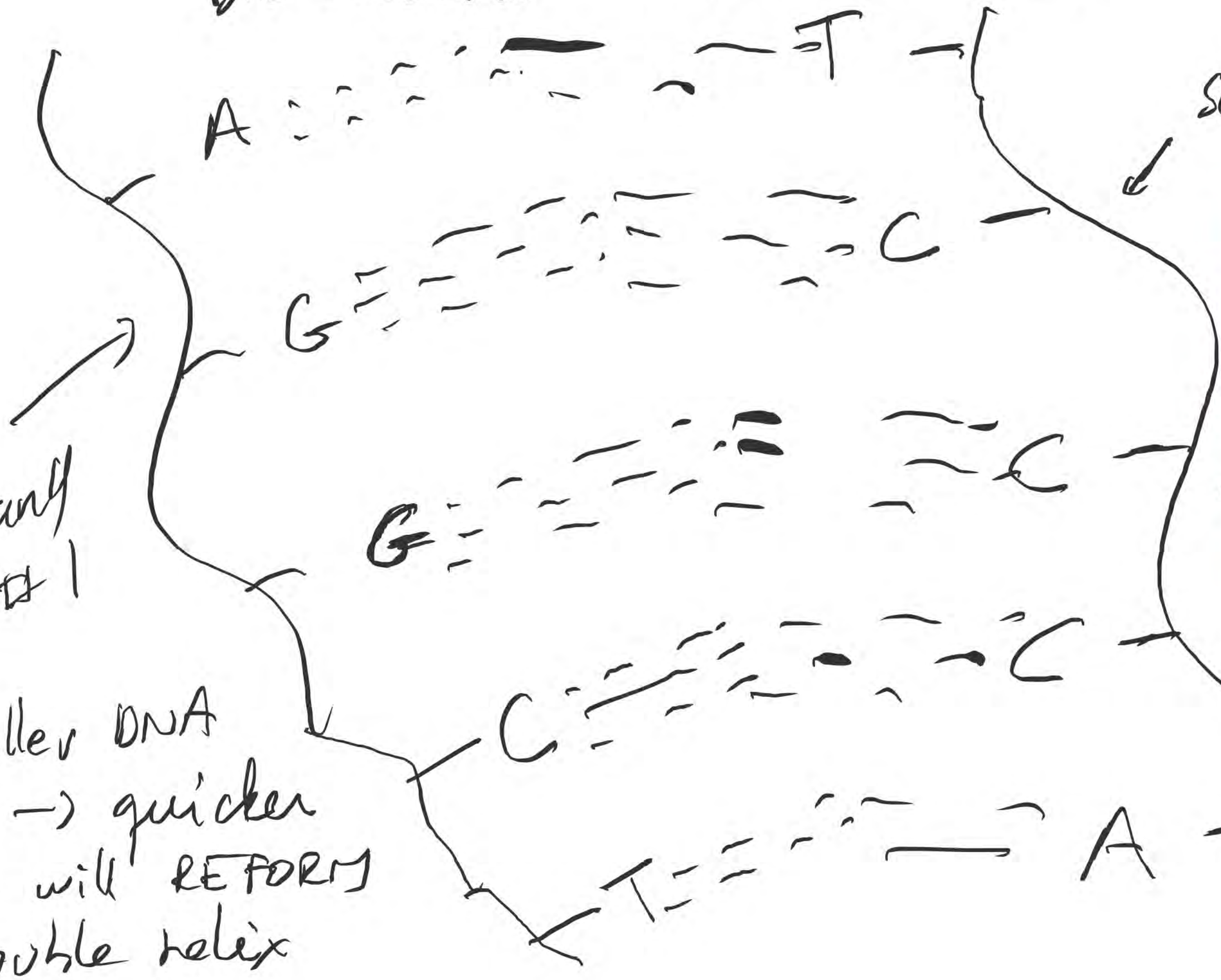
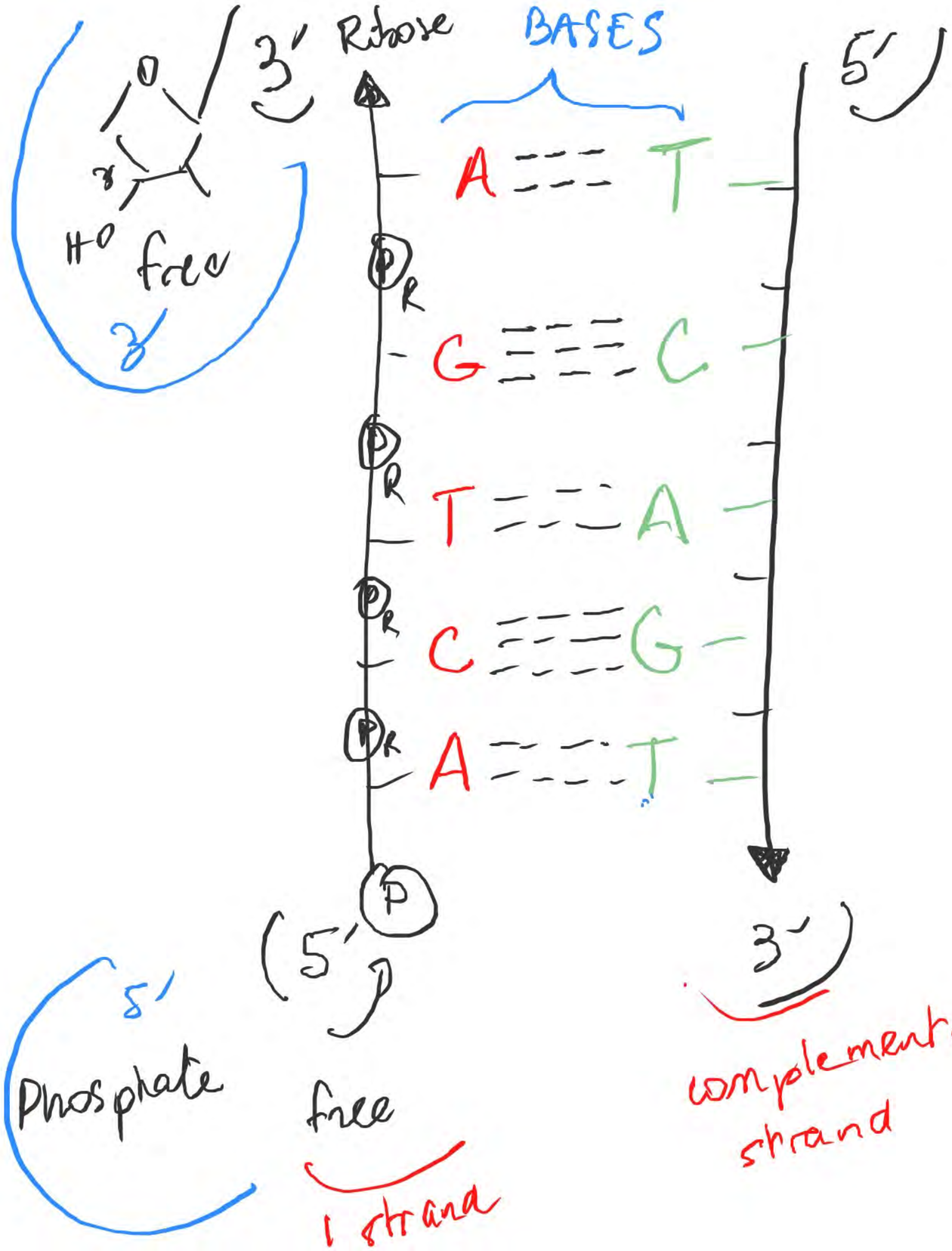
BIG MOLECULE → SPECIFIC H bond



With DNA take so much time to form once separate!

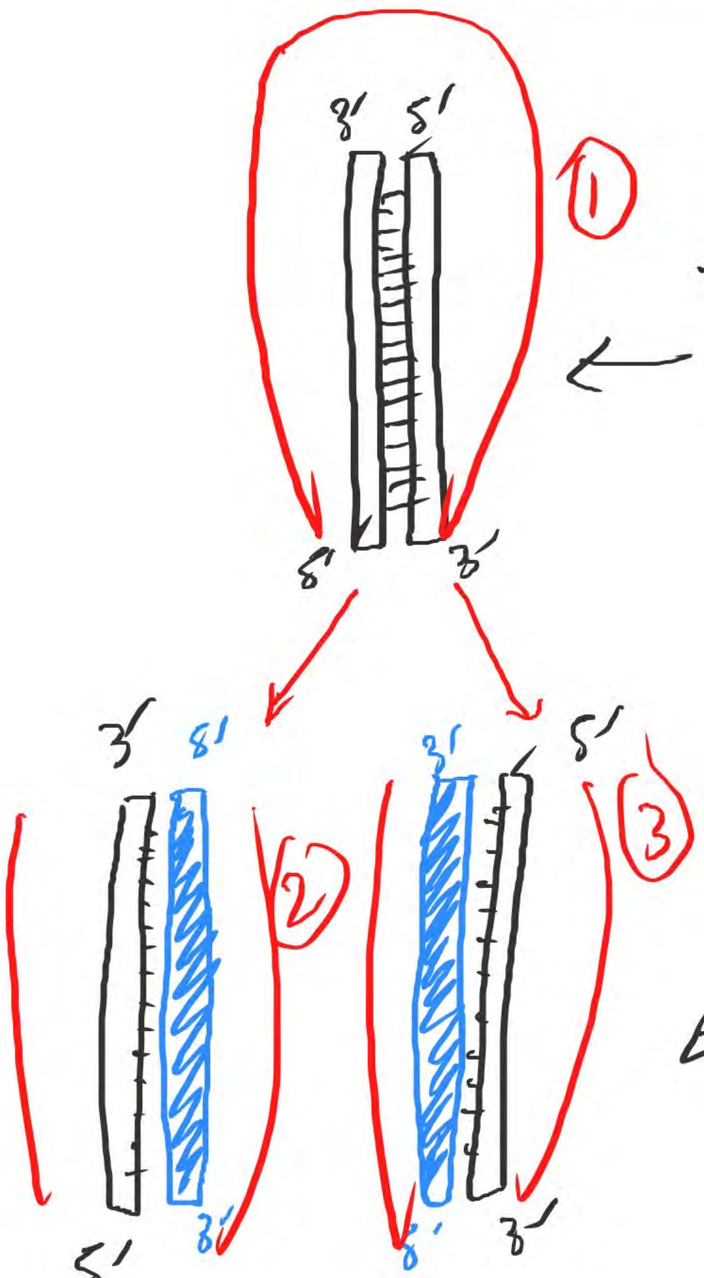
smaller DNA is → quicker you will REFORM double helix



* DNA = double stranded helix

* between Nucleotide = Hydrogen bonds : { 2 H bonds A = T ; 3 H bonds G ≡ C

SEMICONSERVATIVE MODEL OF DNA REPLICATION



(1) = (2) = (3)

exact copy

"daughter" cell

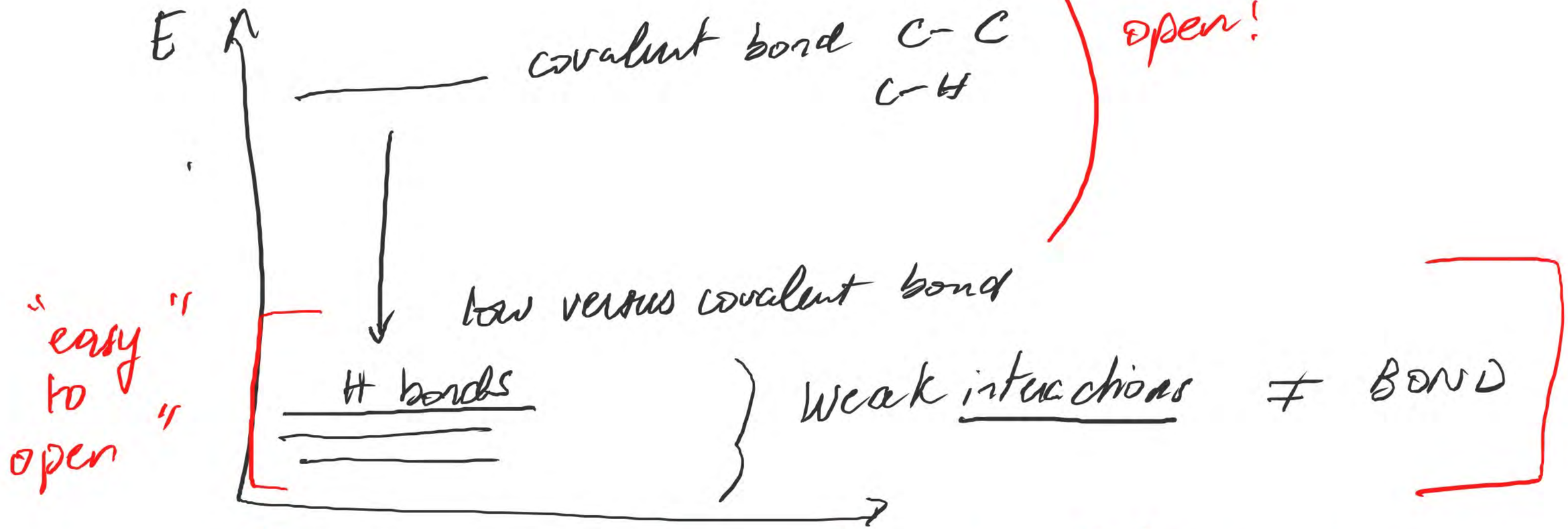
} = SEMICONSERVATIVE

DNA - Replication -

How the replication is done ?

Creation of a REPLICATION FORK by the opening DNA strands.

⚠ WHY IS IT POSSIBLE TO OPEN THE DNA HELIX?
→ BASED H-bond interaction (and other).



H bonds: can be broken by ↑ temperature
or by specific Enzyme (protein)

FORK OF REPLICATION.

origin (point where Replication starts)

CONTINOUS

DNA POLYMERASE

1

2

3

3'

5'

New DNA strand

RNA primer

Continous synthesis

OKAZAKI fragment

HELICASE

HELICASE

Lagging strand

Leading strand

RNA primer

continous synthesis

DNA polymerase

RNA PRIMER

5' → 3': New DNA is CONTINOUSLY SYNTHETIZED.

LAB

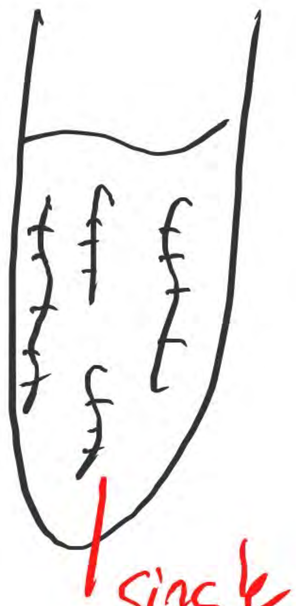
double-strand DNA helix

BROKE ALL H BONDS

↑ Temp

~70° C
80° C

↑ LAB

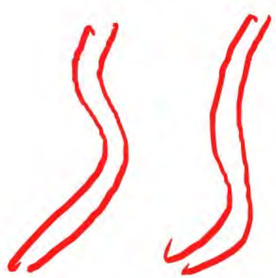


single DNA strand

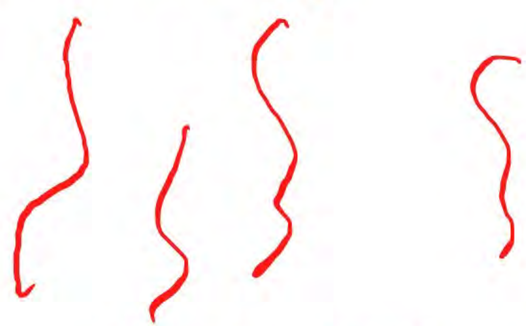
= Separate my DNA into SINGLE STRAND DNA

↓ cell or BODY (~37°C)

Enzyme



double-stranded DNA



single DNA

Enzyme = proteins (molecule) that facilitate the reaction by lowering the activation Energy.

* ONLY DIRECTION THAT NEW DNA IS SYNTHETIZED IS 5'→3'
IT NEEDS AN INITIAL RNA PRIMER Then the NEW DNA
IS SYNTHETIZED VIA THE DNA POLYMERASE.

* THE DNA IS SYNTHETIZED ON BOTH DIRECTION FROM
THE ORIGIN OF THE OPENING OF THE DOUBLE-STRANDED
DNA HELIX : OPENED BY HELICASE.

* THE LAGGING STRAND IS MADE OF A SUCCESSION OF
OKAZAKI FRAGMENTS.

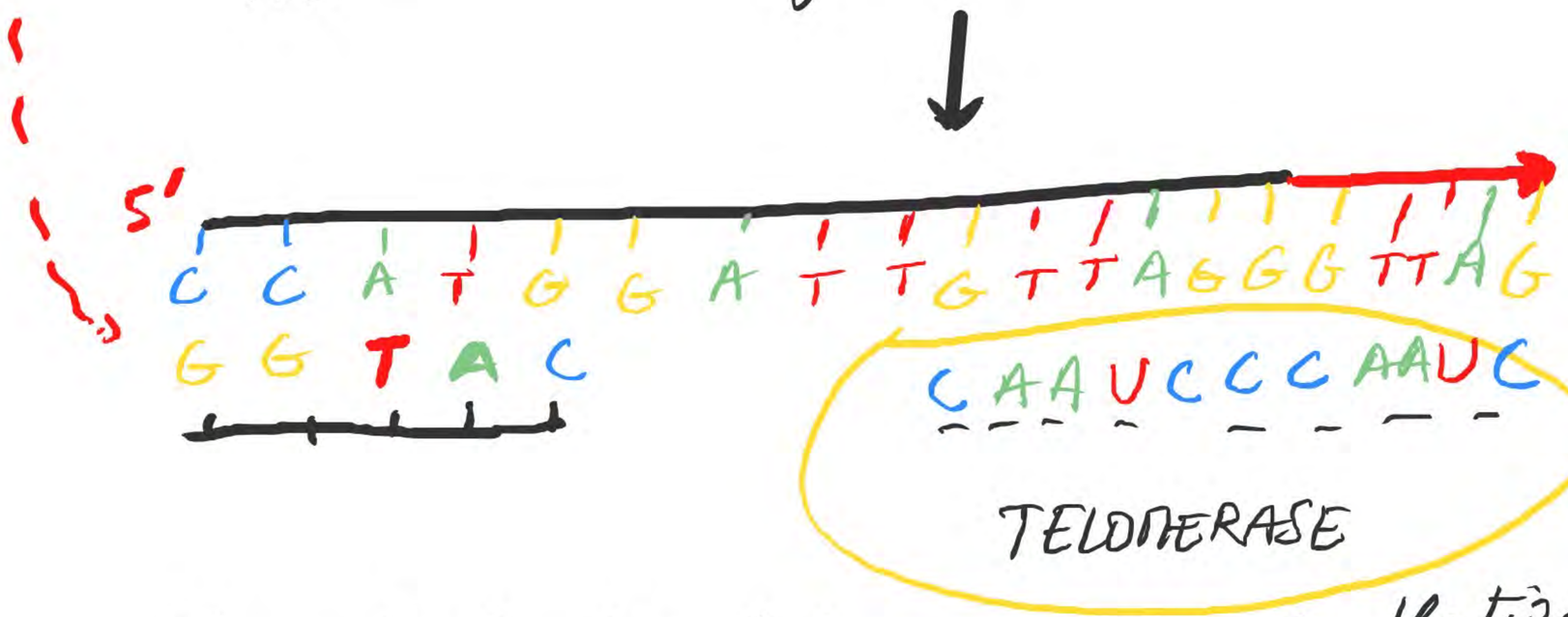
* ALL OKAZAKI FRAGMENTS WILL BE JOINED TOGETHER BY
DNA LIGASE (Enzyme).
(substrat) (what it does)

⚠ Name of enzyme
- SUBSTRAT ⊕ ACTION -

- The ends of linear chromosomes are maintained by the action of the TELOMERASE ENZYMES.

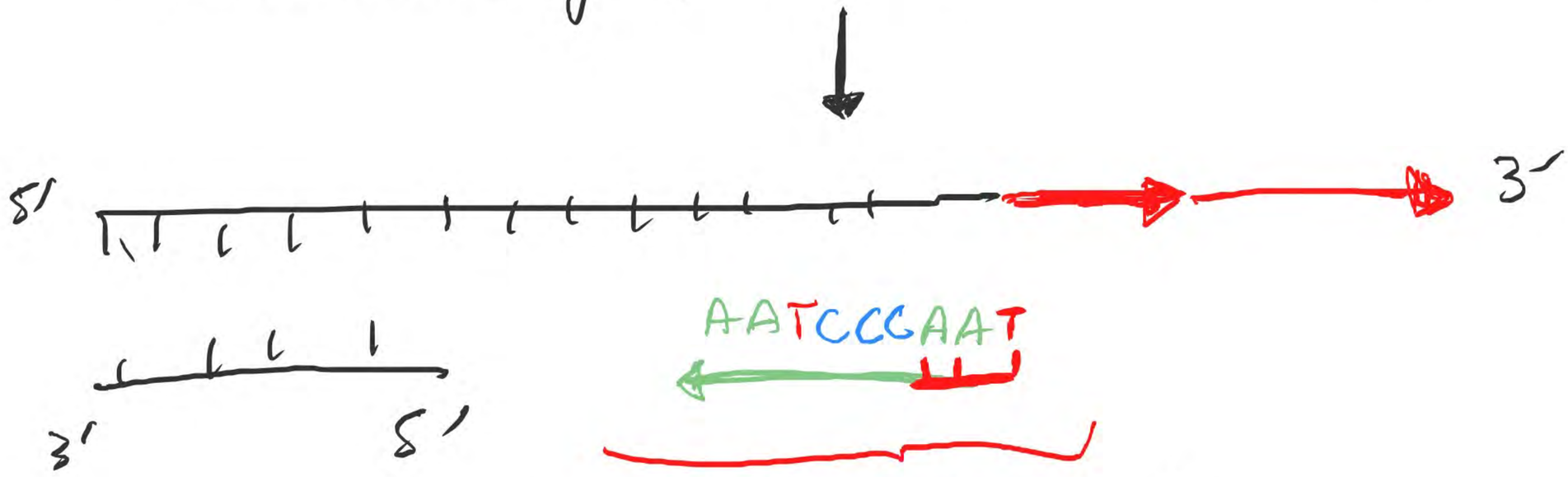
Remember: DNA ATGC
RNA AUGC

Telomerase has an associated RNA that complements the 3' overhang at the end of the chromosome.

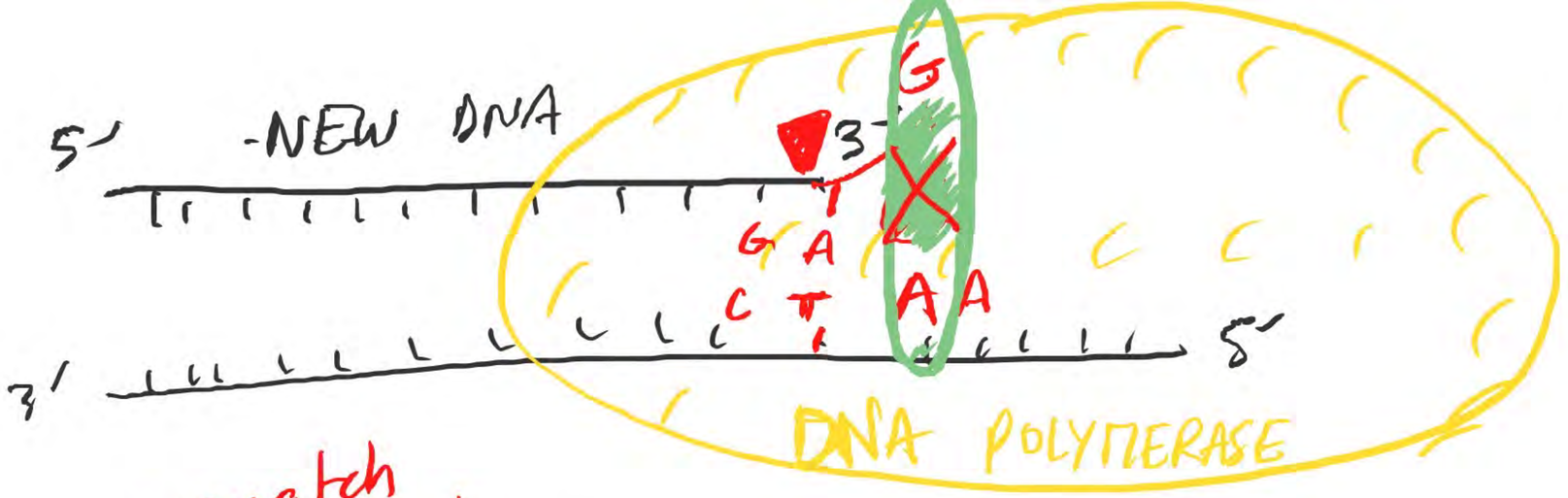


The RNA template is used to synthetized the complementary strand.

Telomerase shifts, and the process is repeated



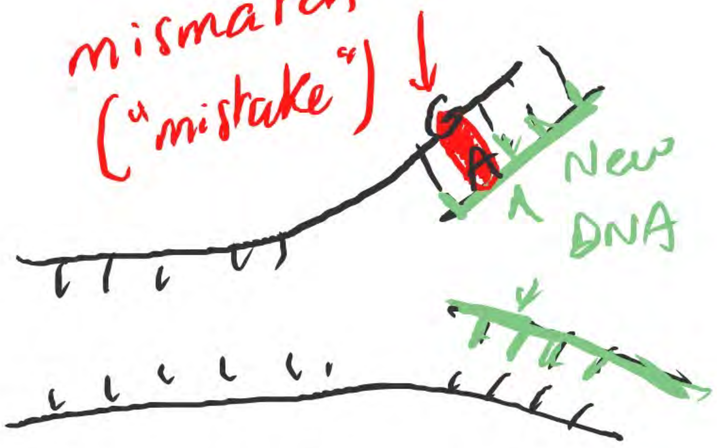
New synthesized DNA end replaces the RNA template



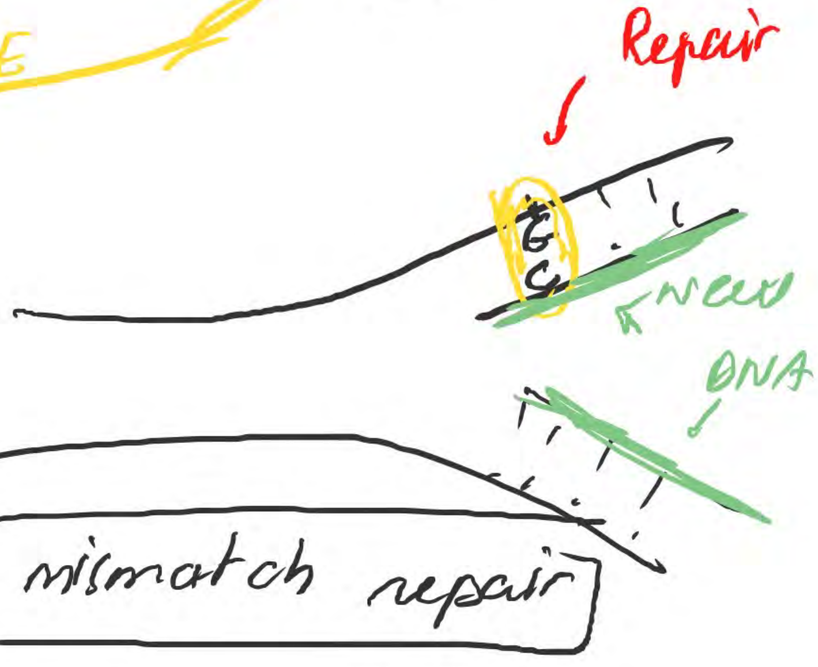
DNA polymerase:

PROOFREADING

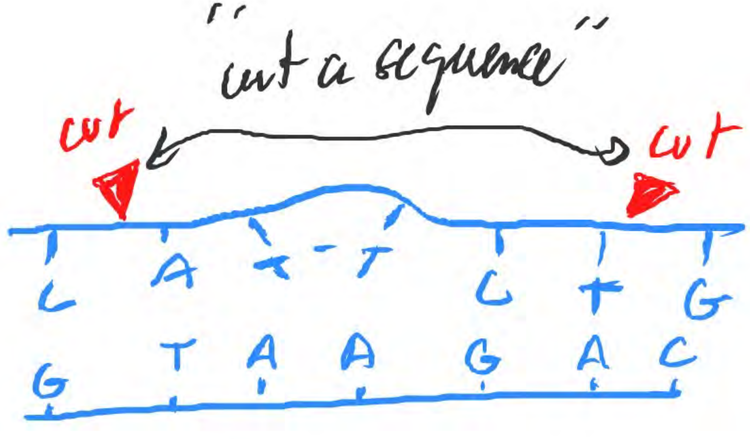
(1)

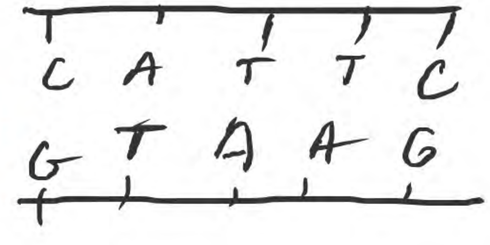


direction



(2) mismatch repair





"Repaired" DNA

(3) Nucleotide excision

[(1), (2), (3) = DNA "repair" methods]

DOGMA

DNA

RNA

PROTEIN

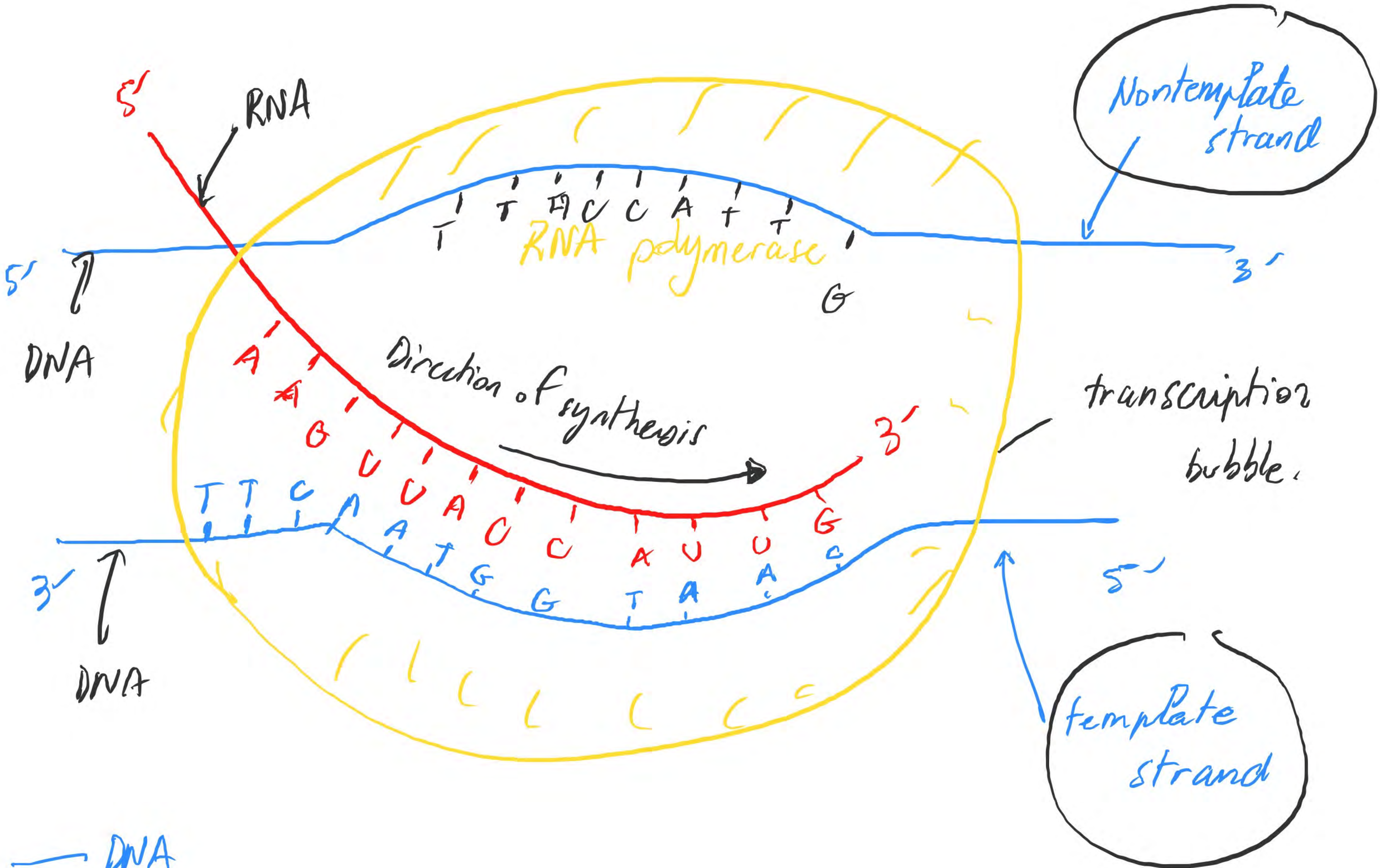
ENCODES

ENCODES

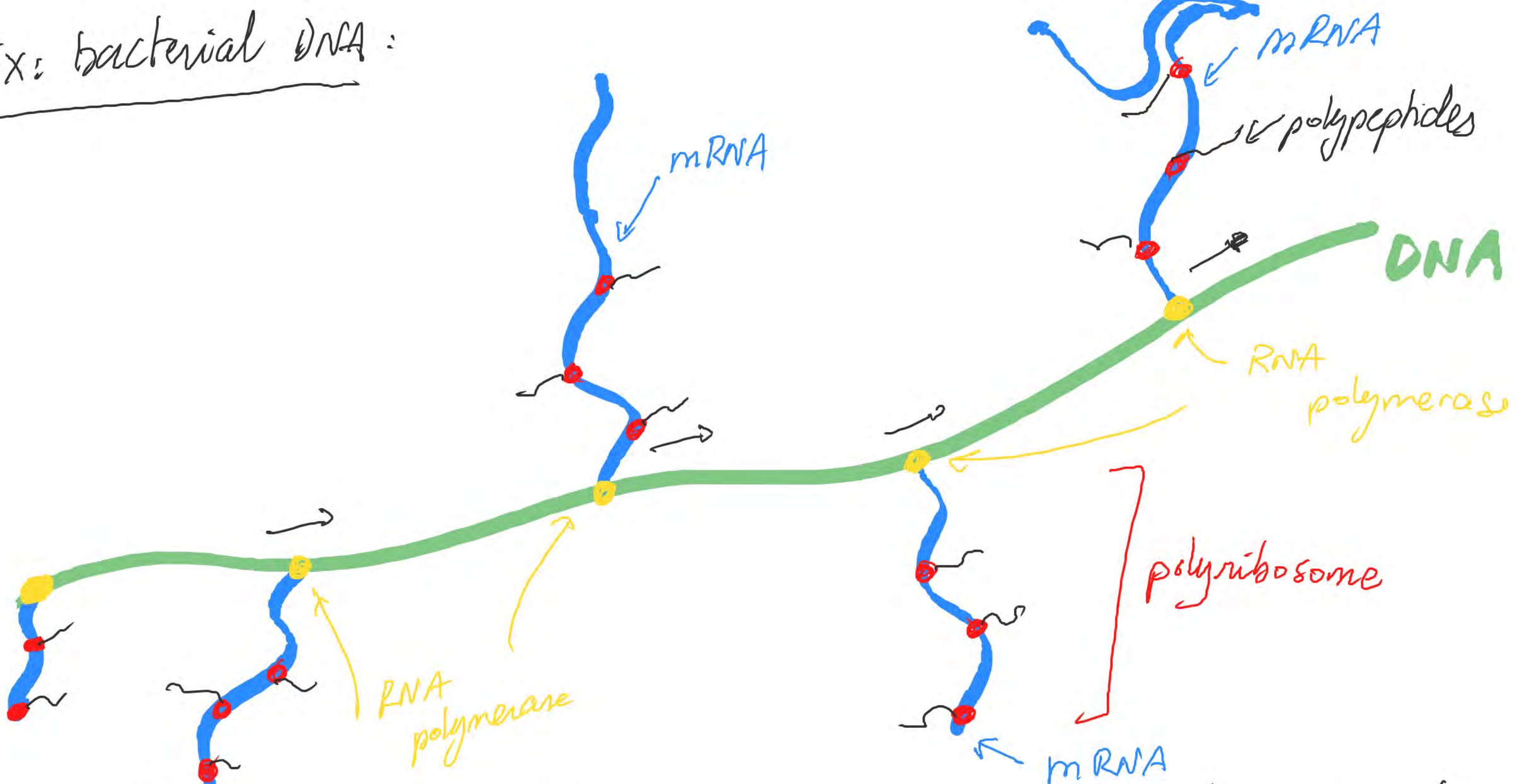
SAME TIME

≠

STEPS


5'
RNA
Nontemplate strand
T T A C C A T T
RNA polymerase
5'
3'
DNA
G
A
A
G
C
U
A
C
C
A
U
G
Direction of synthesis
3'
transcription bubble.
T T C A A T G G T A C
3'
5'
DNA
template strand
DNA
RNA

Ex: bacterial DNA:



⚠ Multiple polymerases can transcribe a single bacterial gene while numerous ribosomes concurrently translate mRNA → polypeptides. In this way, a specific protein can RAPIDLY reach high concentration.

Ex : Company who makes wood table (kitchen)