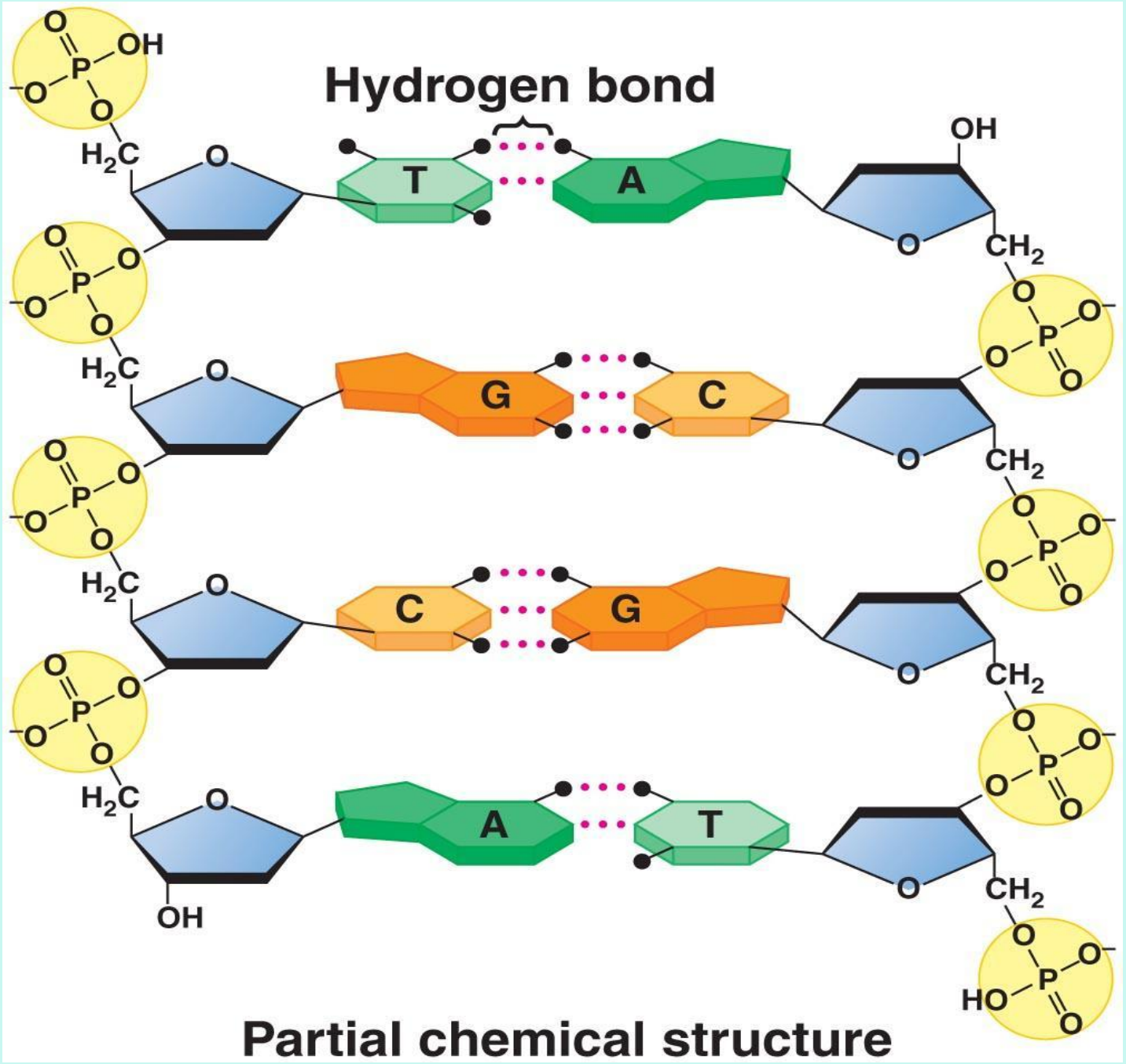
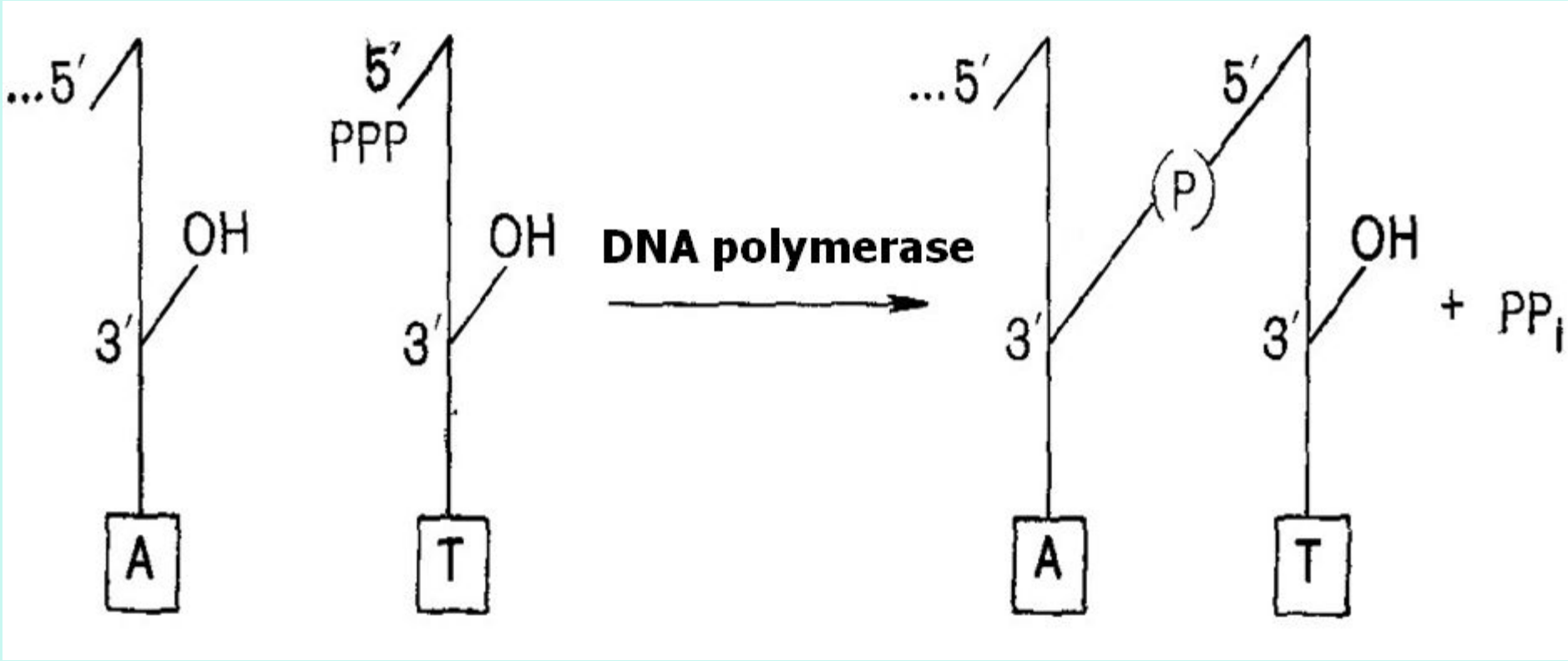
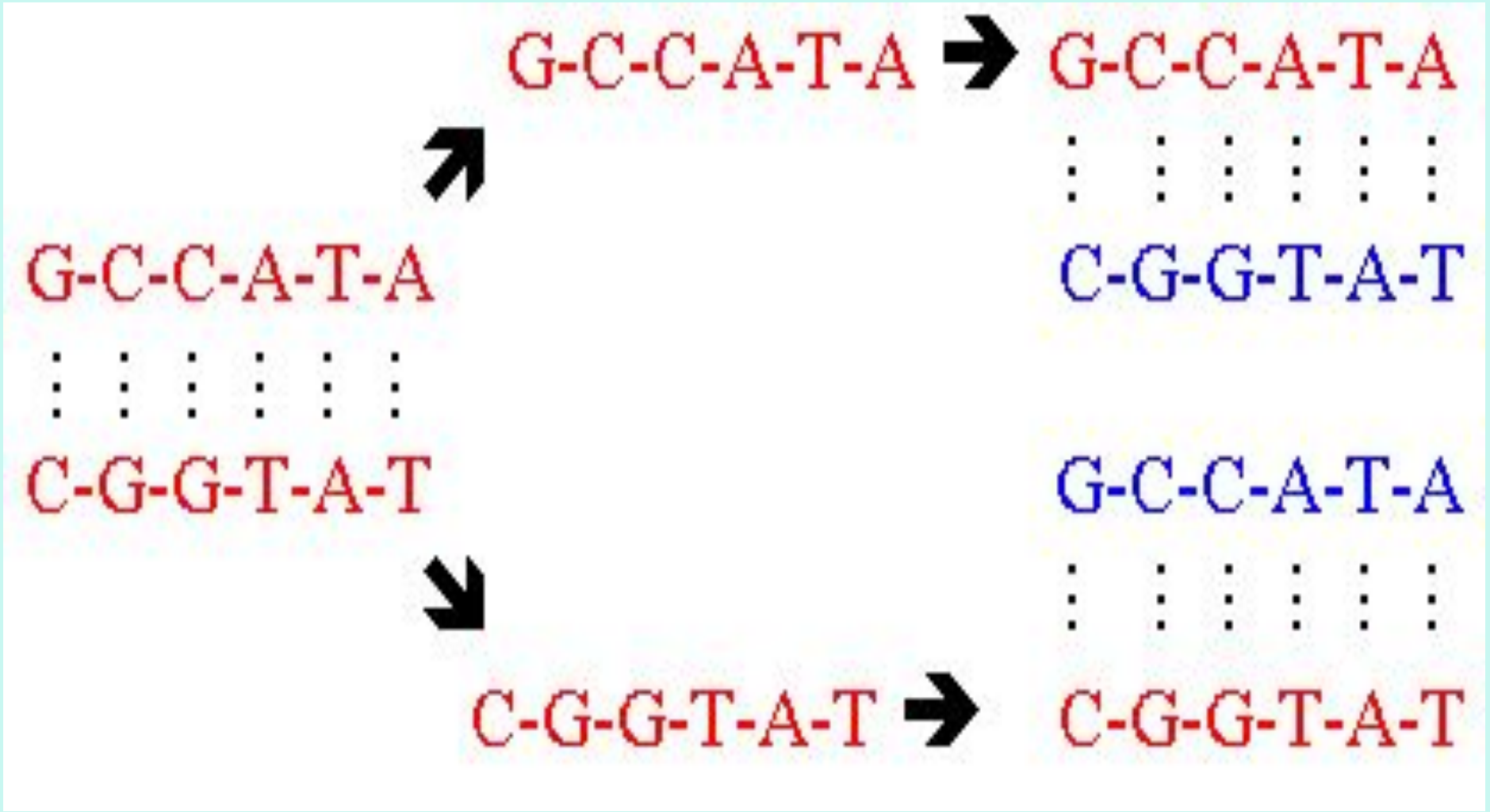
TEMPLATE BIOSYNTHESIS


Hydrogen bond
T
A
G
C
C
G
A
T
Partial chemical structure

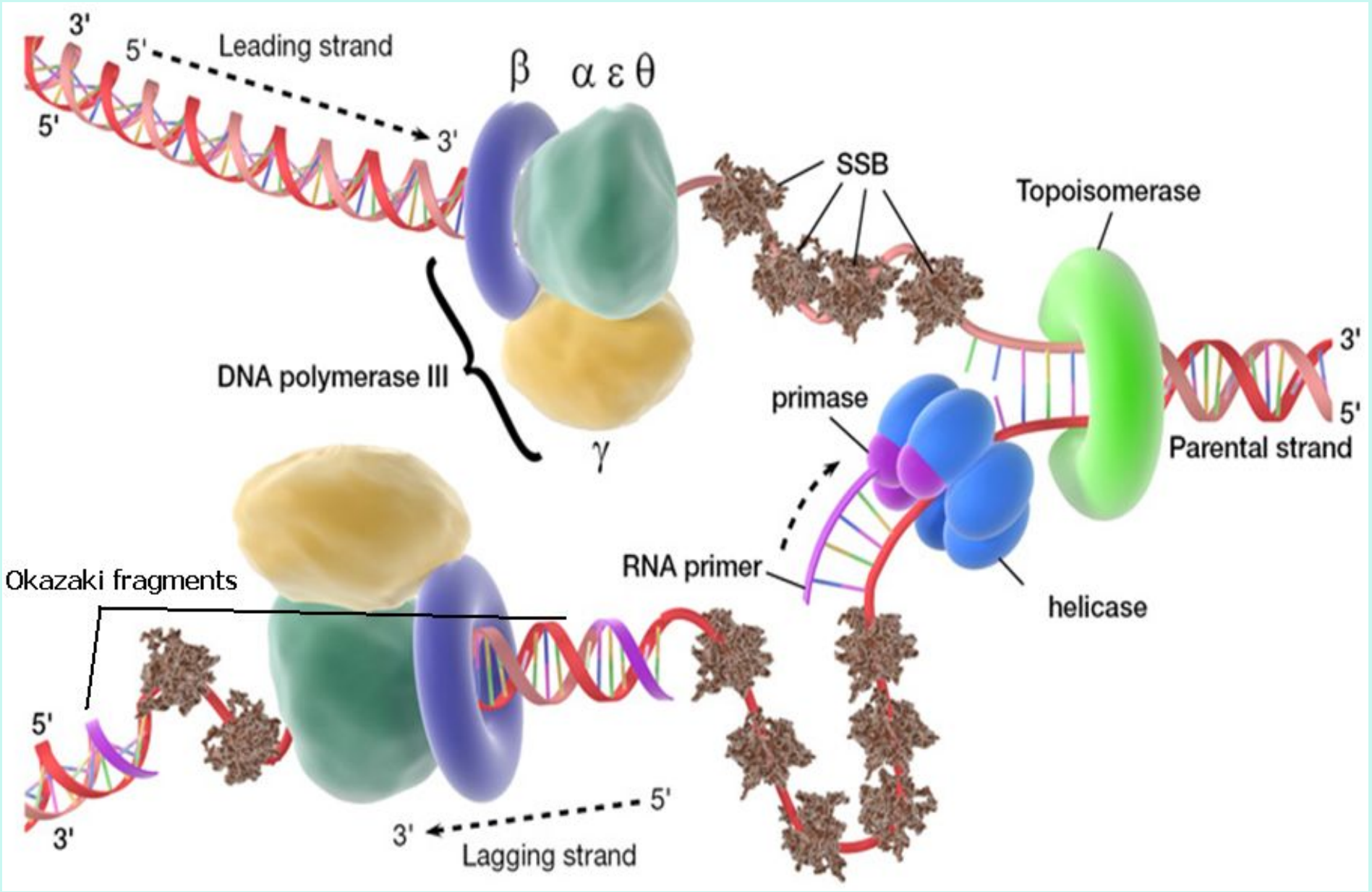
3'-5'-phosphodiester bond formation

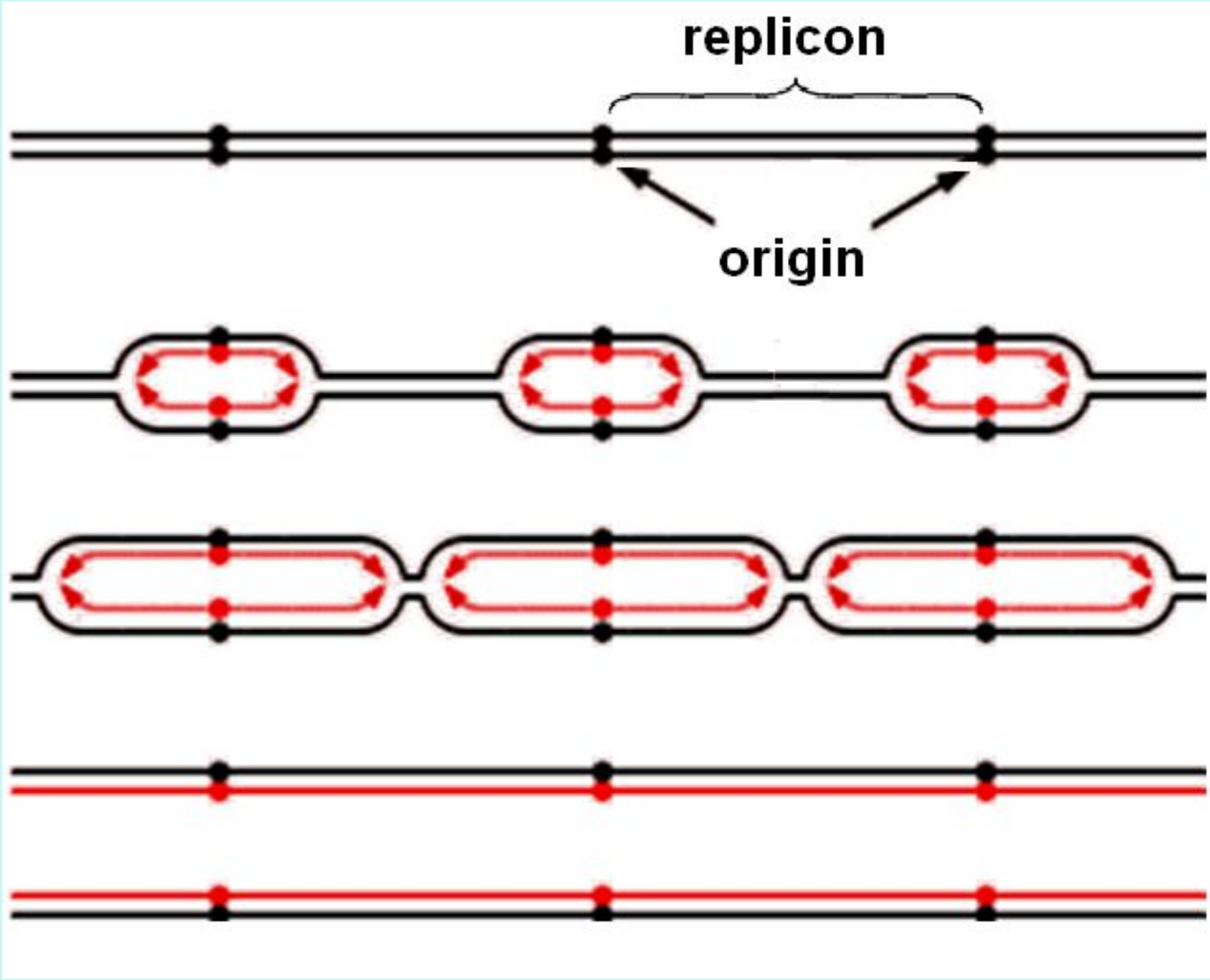


DNA biosynthesis (homologous replication)

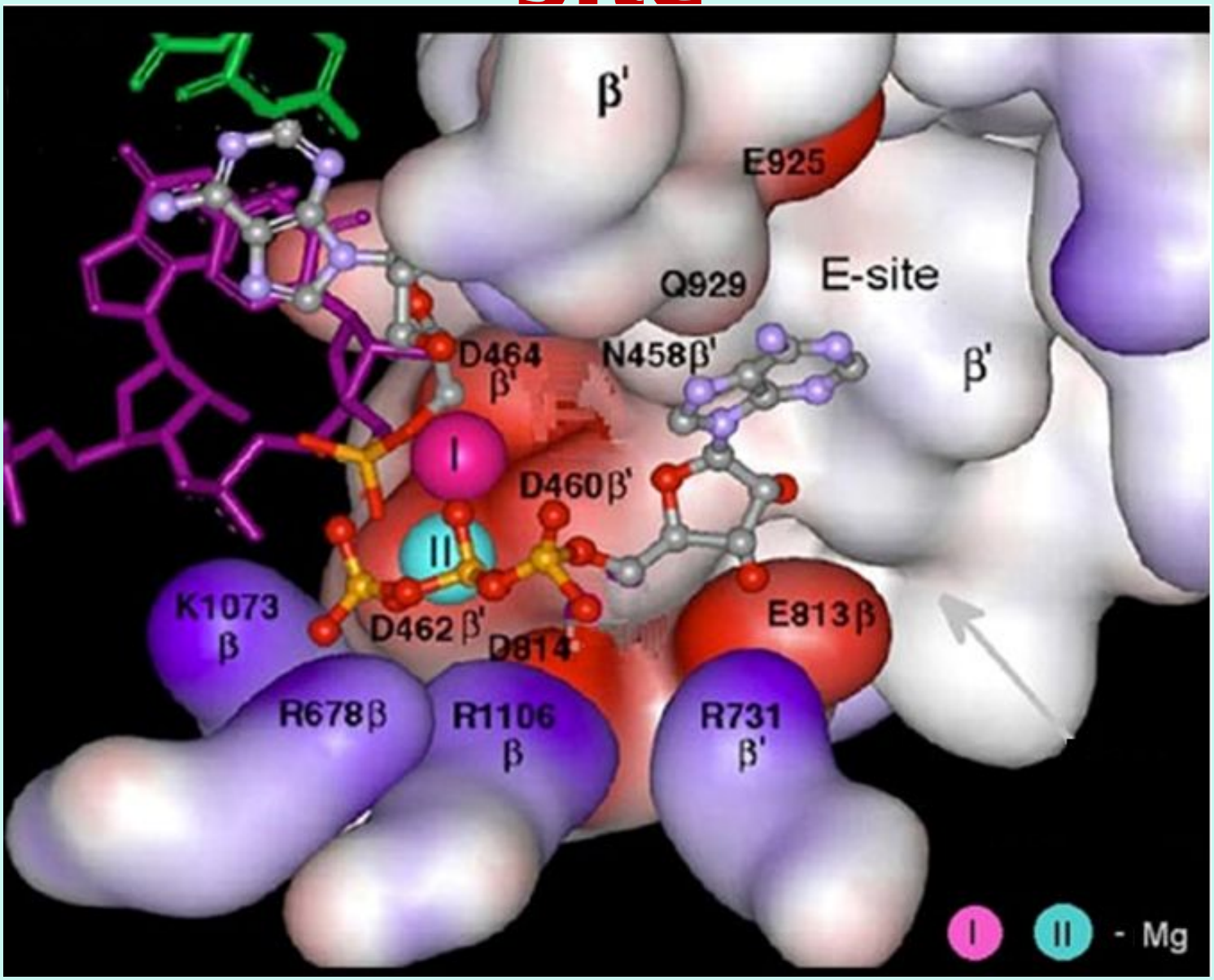


Replicative fork

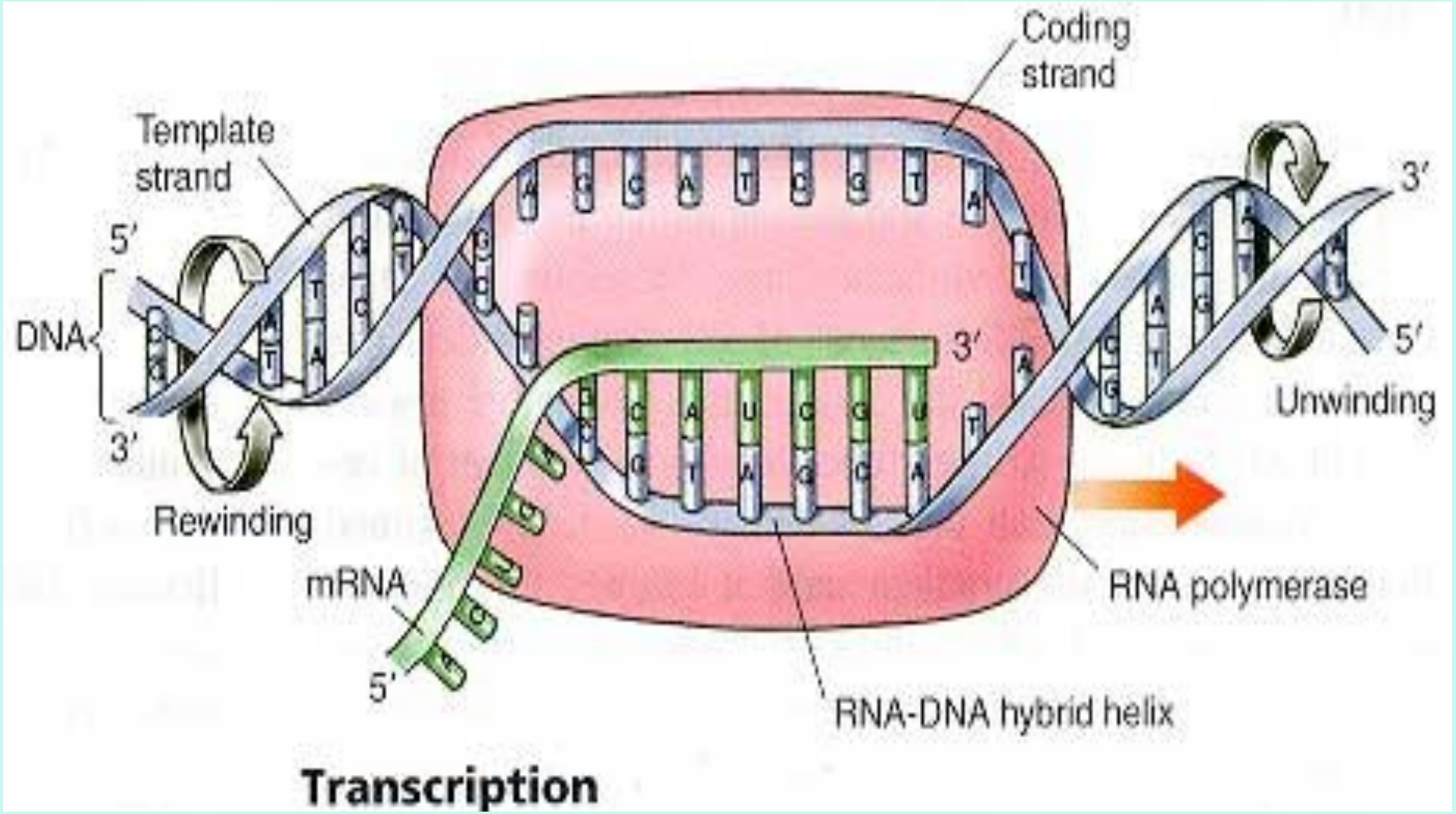



replicon
origin

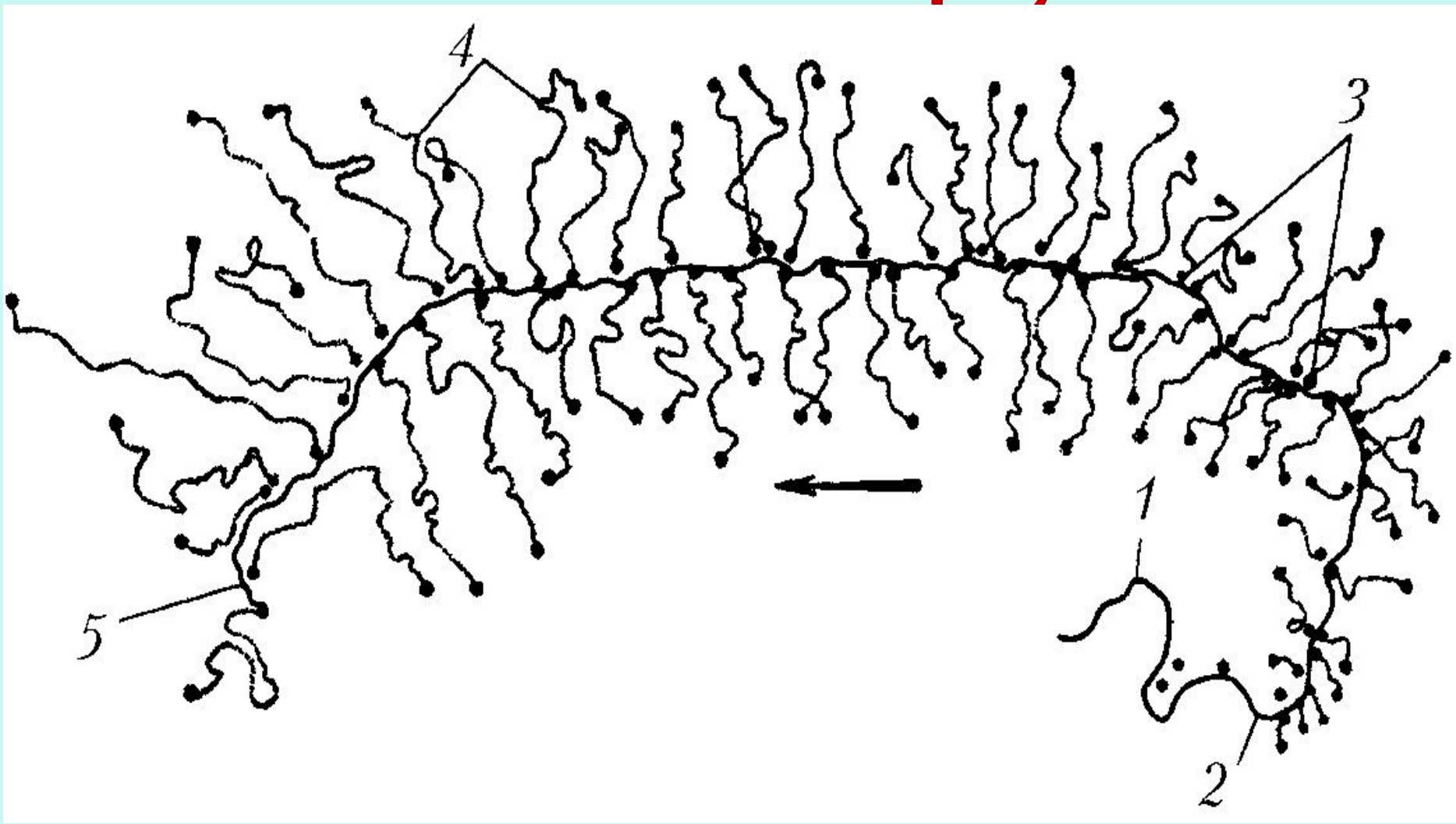
RNA polymerase active site



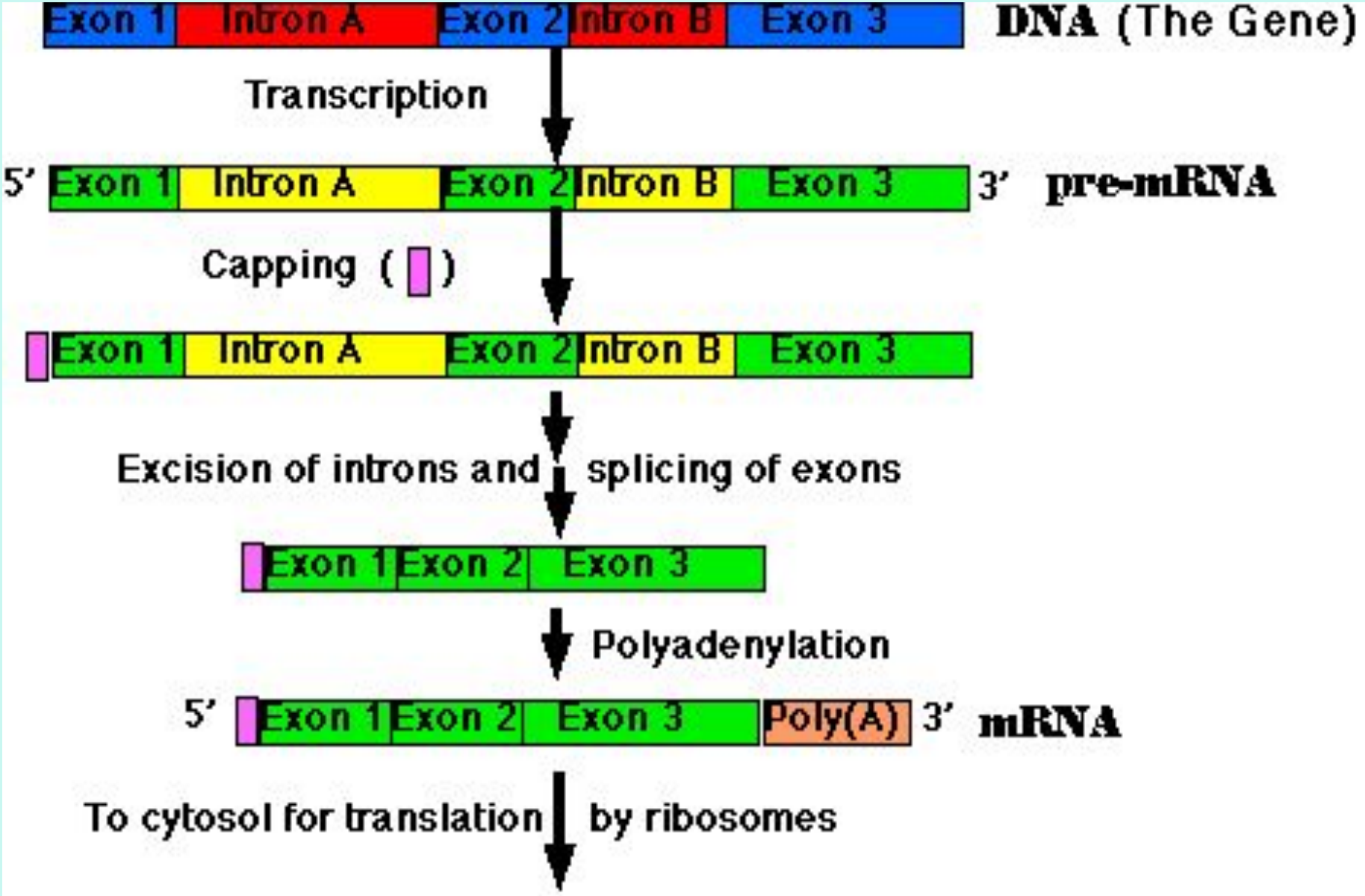
RNA synthesis on DNA template



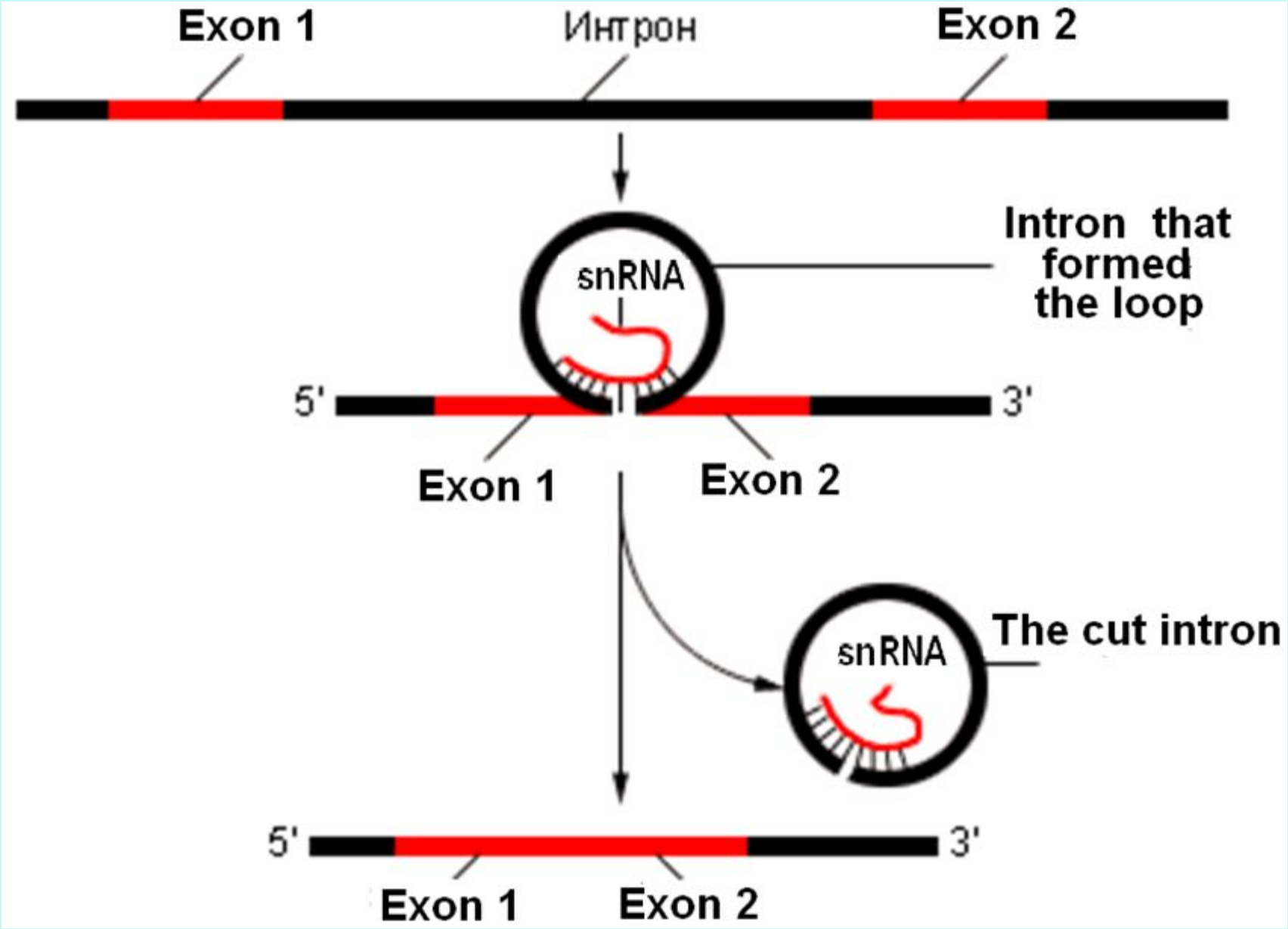
polymerase;
4 - growing RNA chain; 5 - area
of termination.
Arrow: direction of RNA polymerase



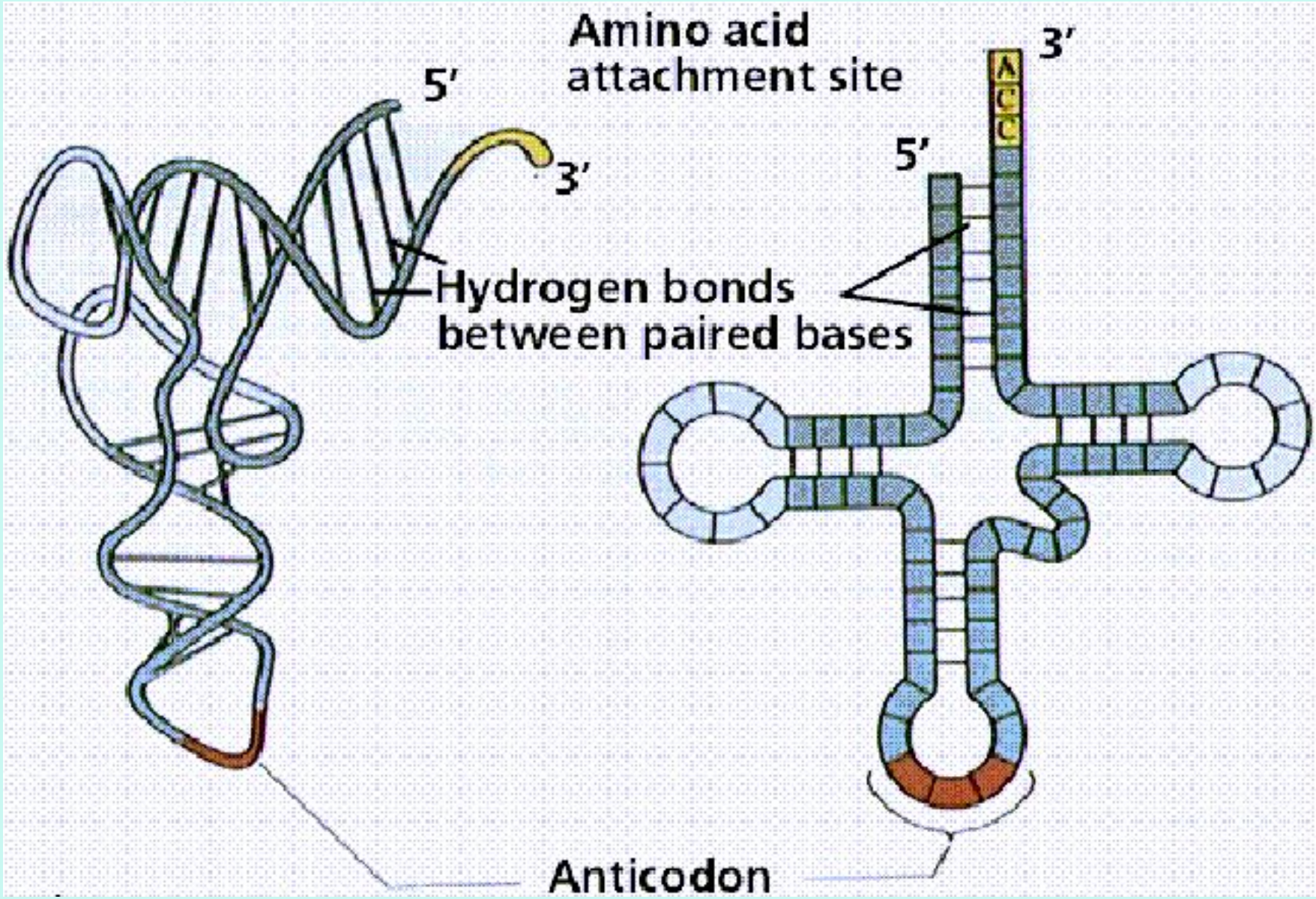
Processing of mRNA



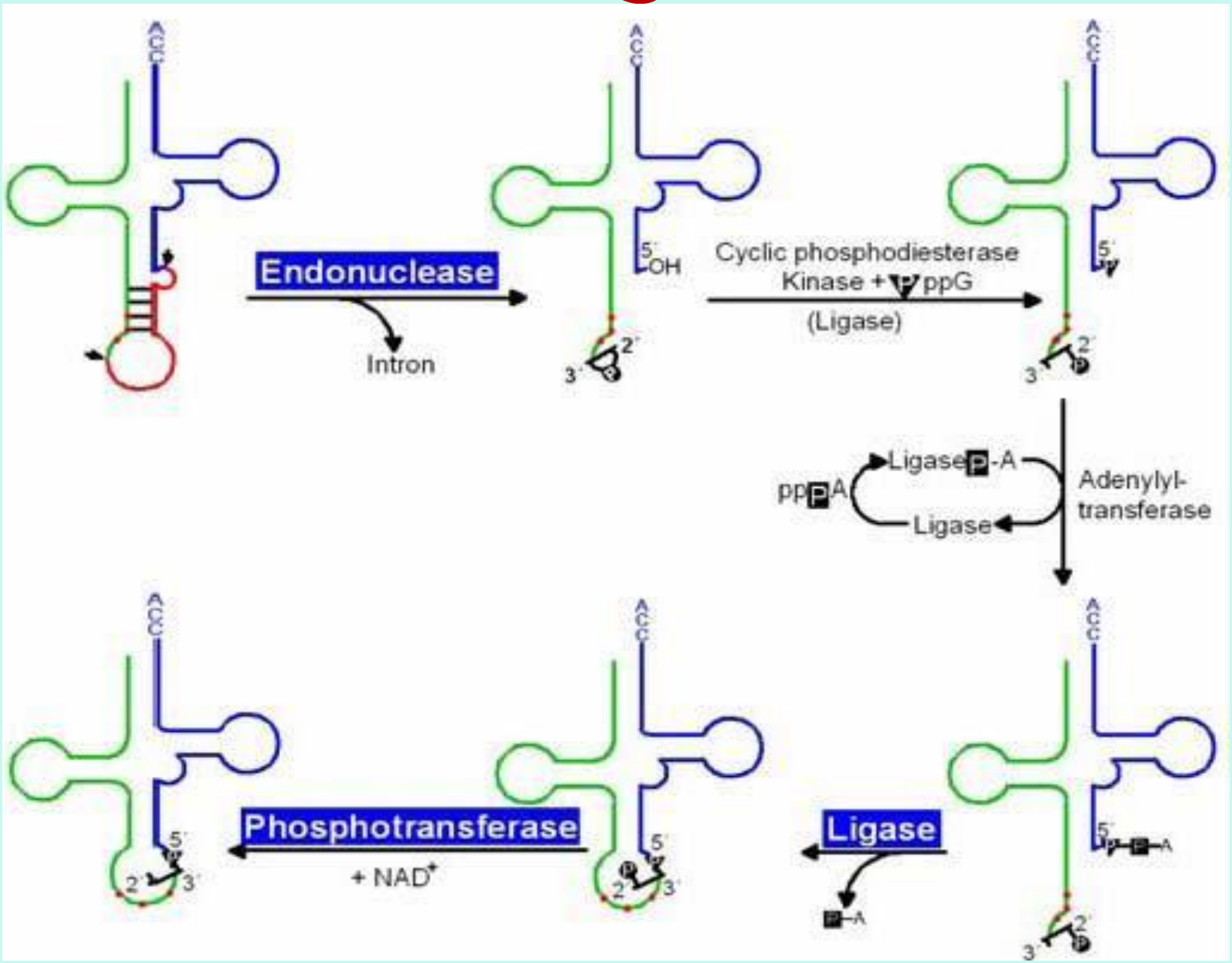
Splicing


Exon 1
Интрон
Exon 2
snRNA
Intron that formed the loop
5'
3'
Exon 1
Exon 2
snRNA
The cut intron
5'
3'
Exon 1
Exon 2

tRNA

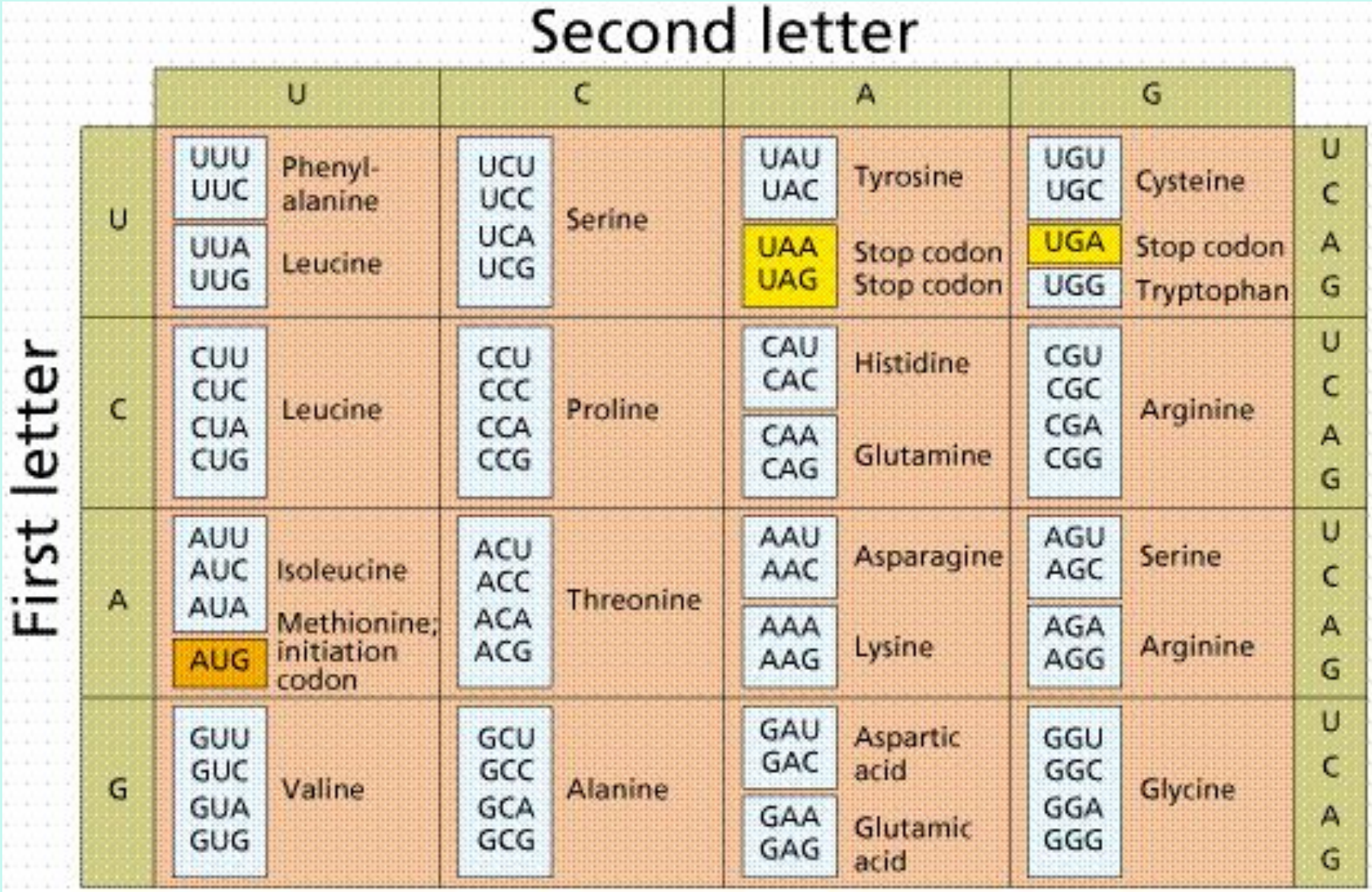

Amino acid
attachment site
5′
3′
5′
3′
Hydrogen bonds
between paired bases
Anticodon

Processing of tRNA

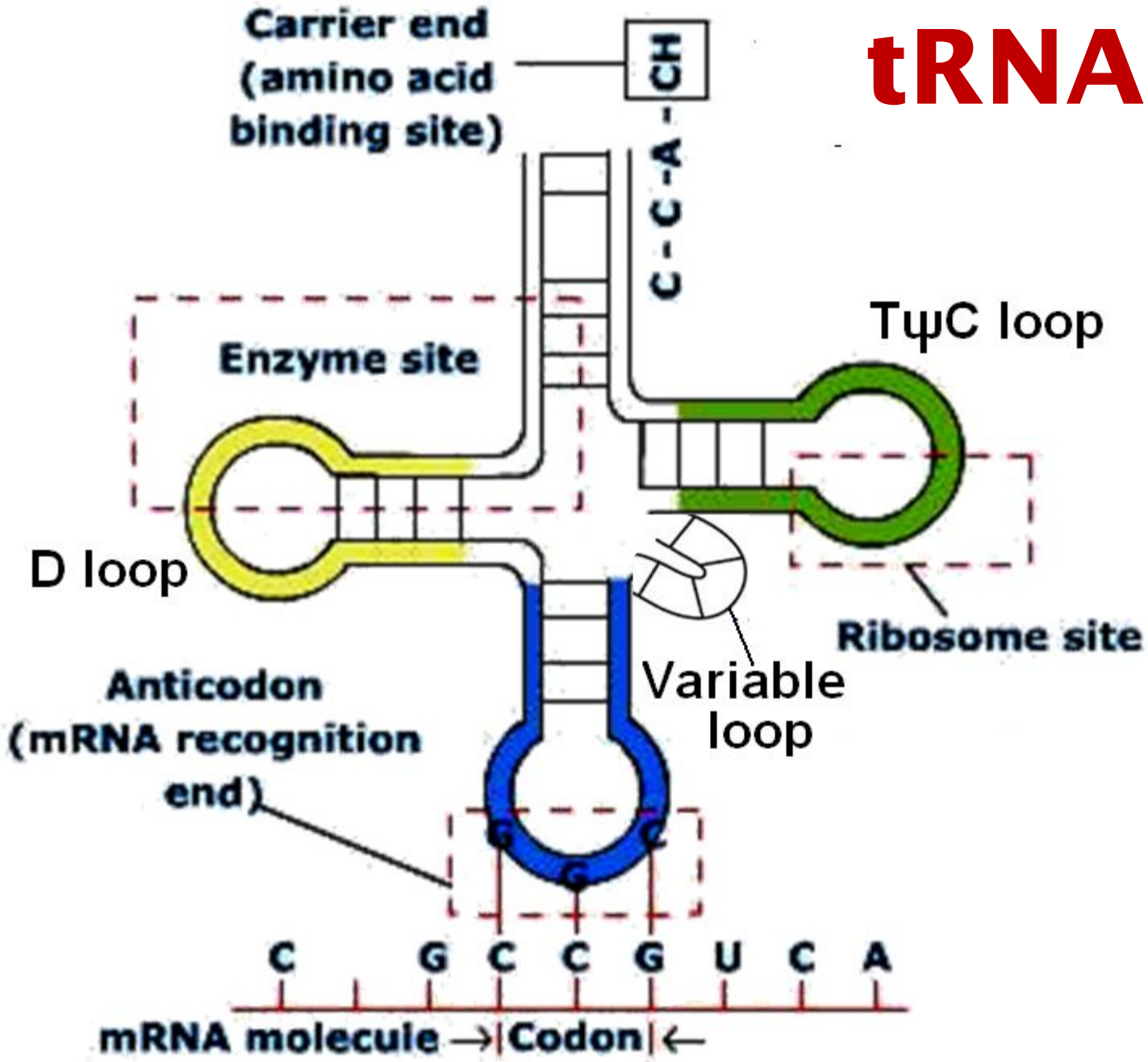


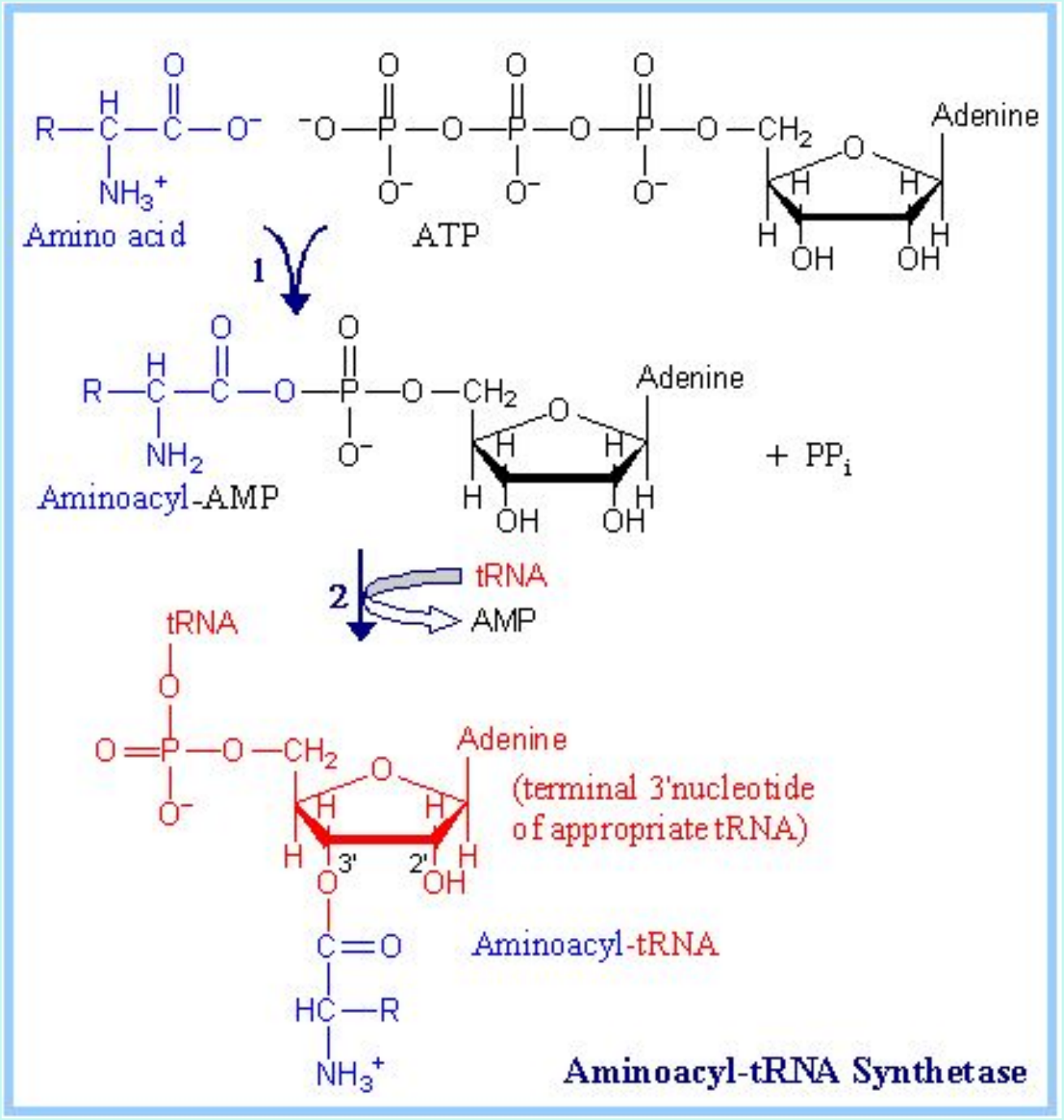
PROTEIN SYNTHESIS

Genetic code

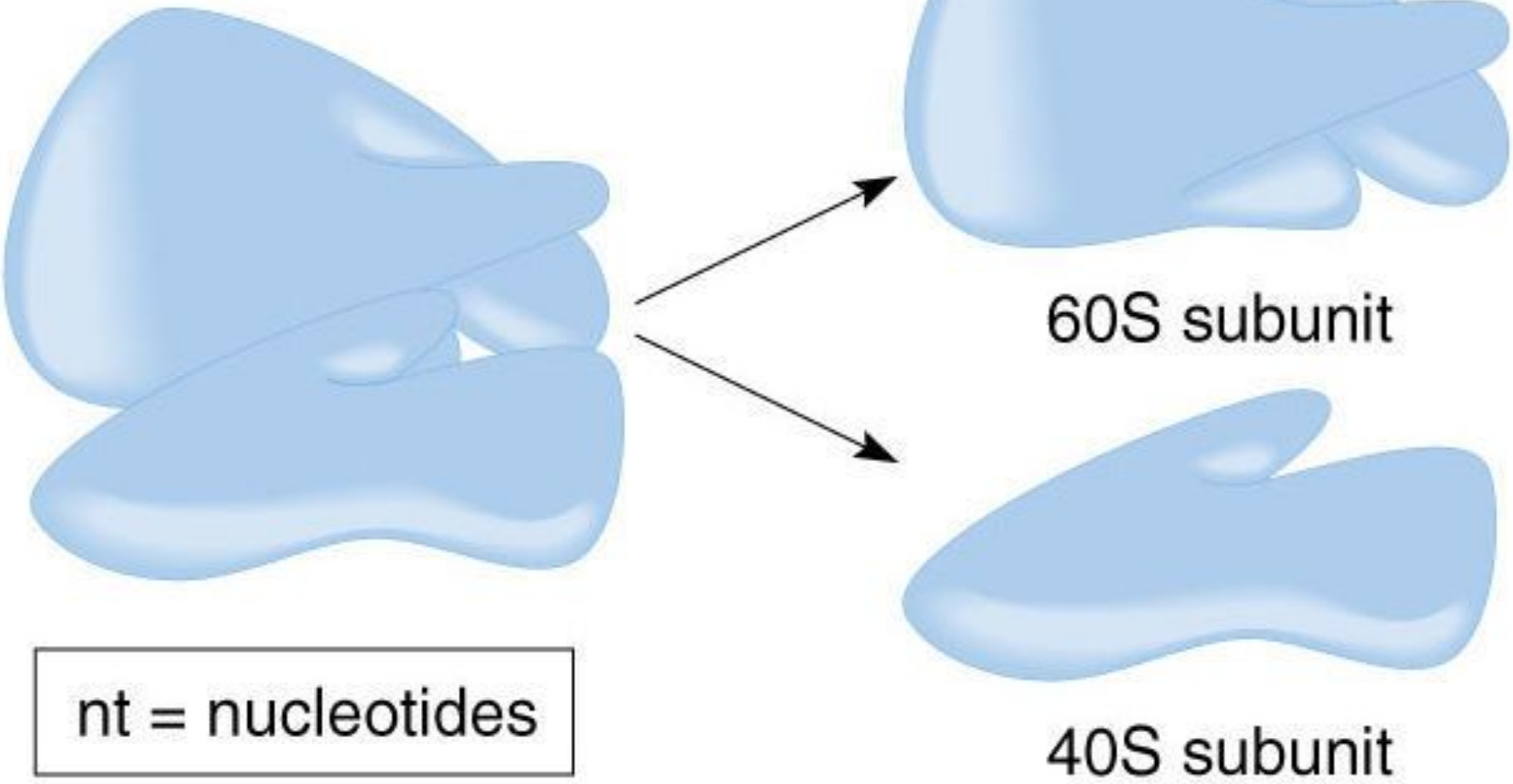


tRNA

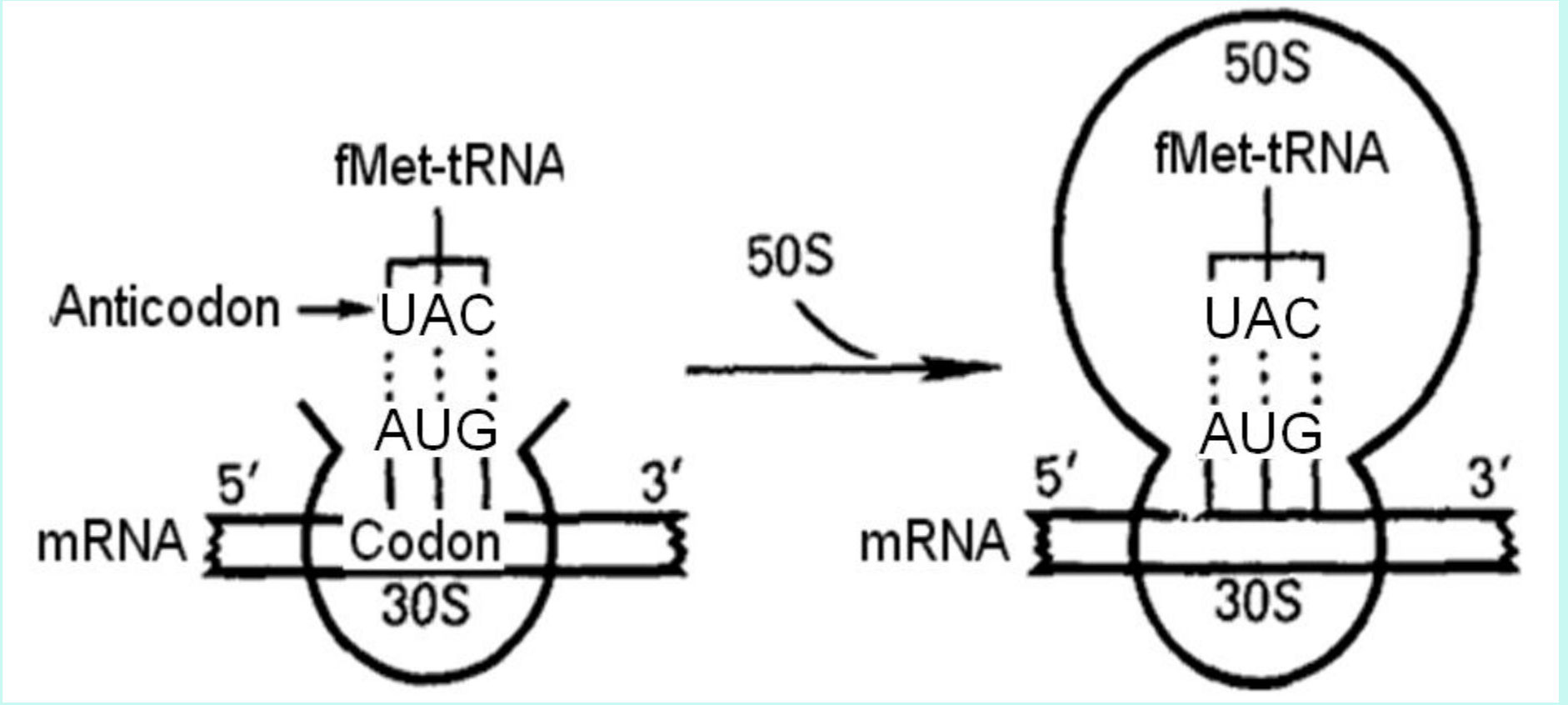

Carrier end
(amino acid
binding site)
C - C - A - CH
Enzyme site
TψC loop
D loop
Ribosome site
Variable
loop
Anticodon
(mRNA recognition
end)
C G C C G U C A
mRNA molecule → Codon ←


Amino acid
ATP
Adenine
1
Aminoacyl-AMP
+ PPi
2
tRNA
AMP
tRNA
Adenine
(terminal 3'nucleotide
of appropriate tRNA)
Aminoacyl-tRNA
Aminoacyl-tRNA Synthetase

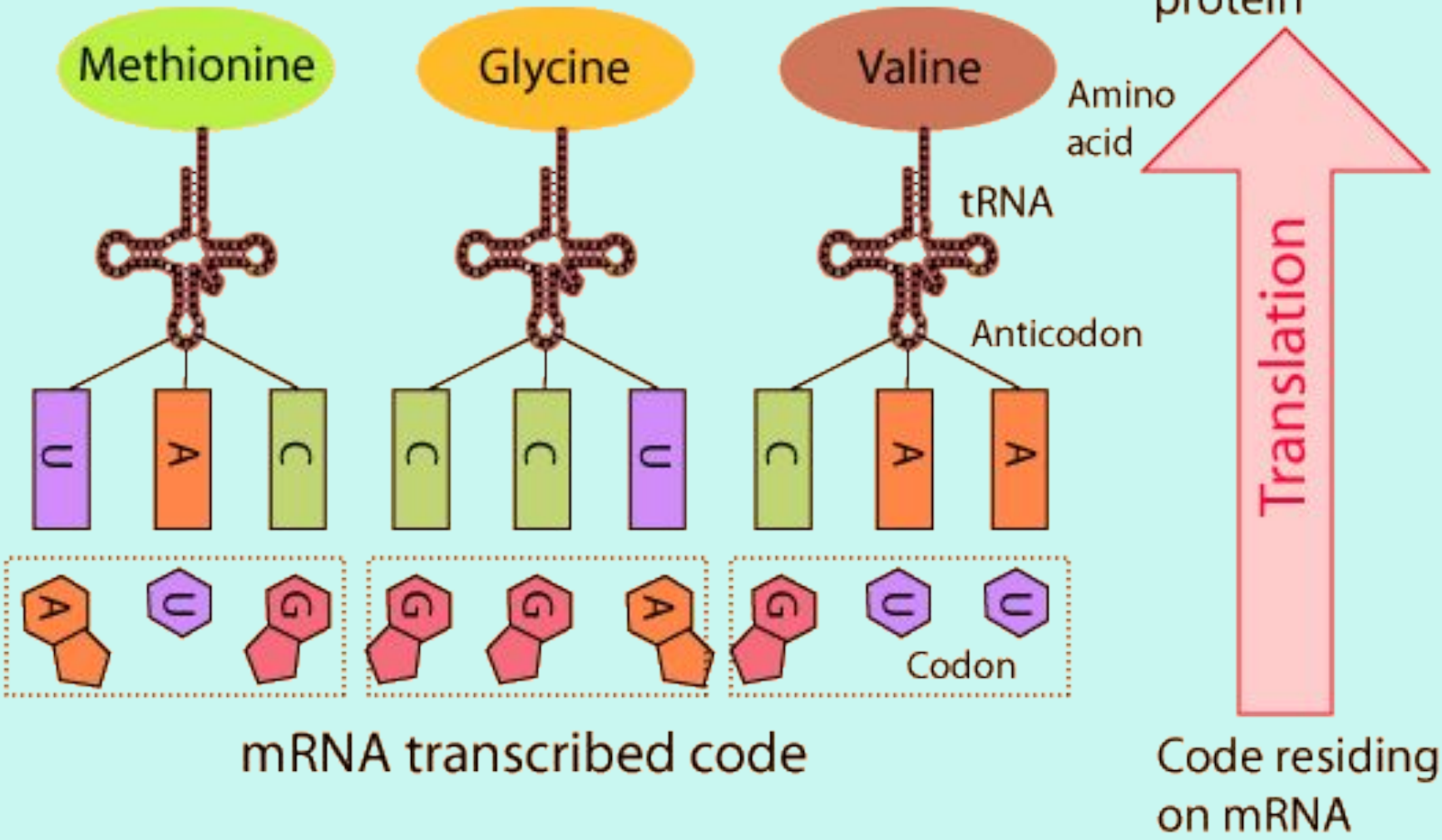
Mammalian
ribosome (80S)
(4.2×10^6 daltons)

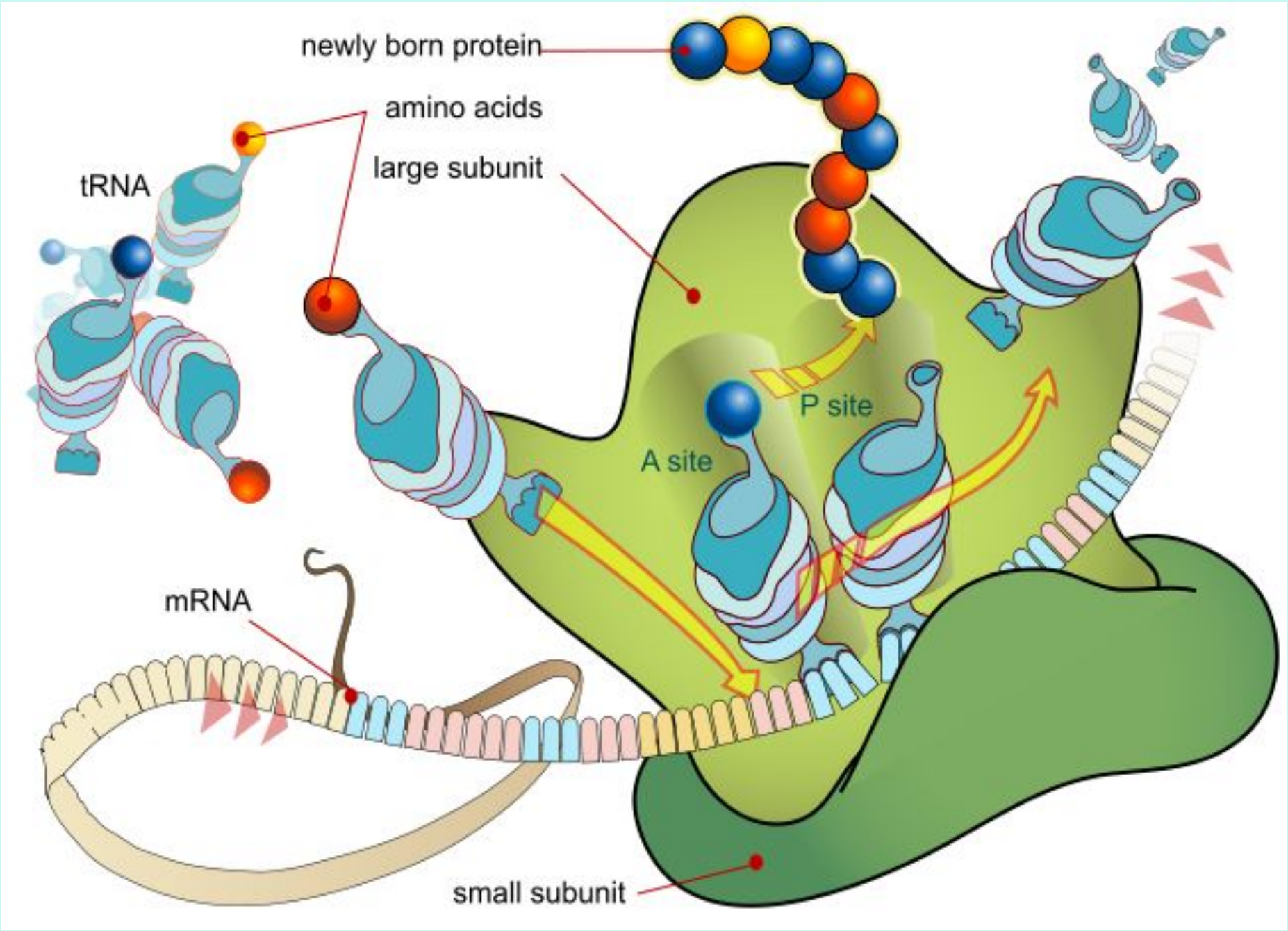


nt = nucleotides

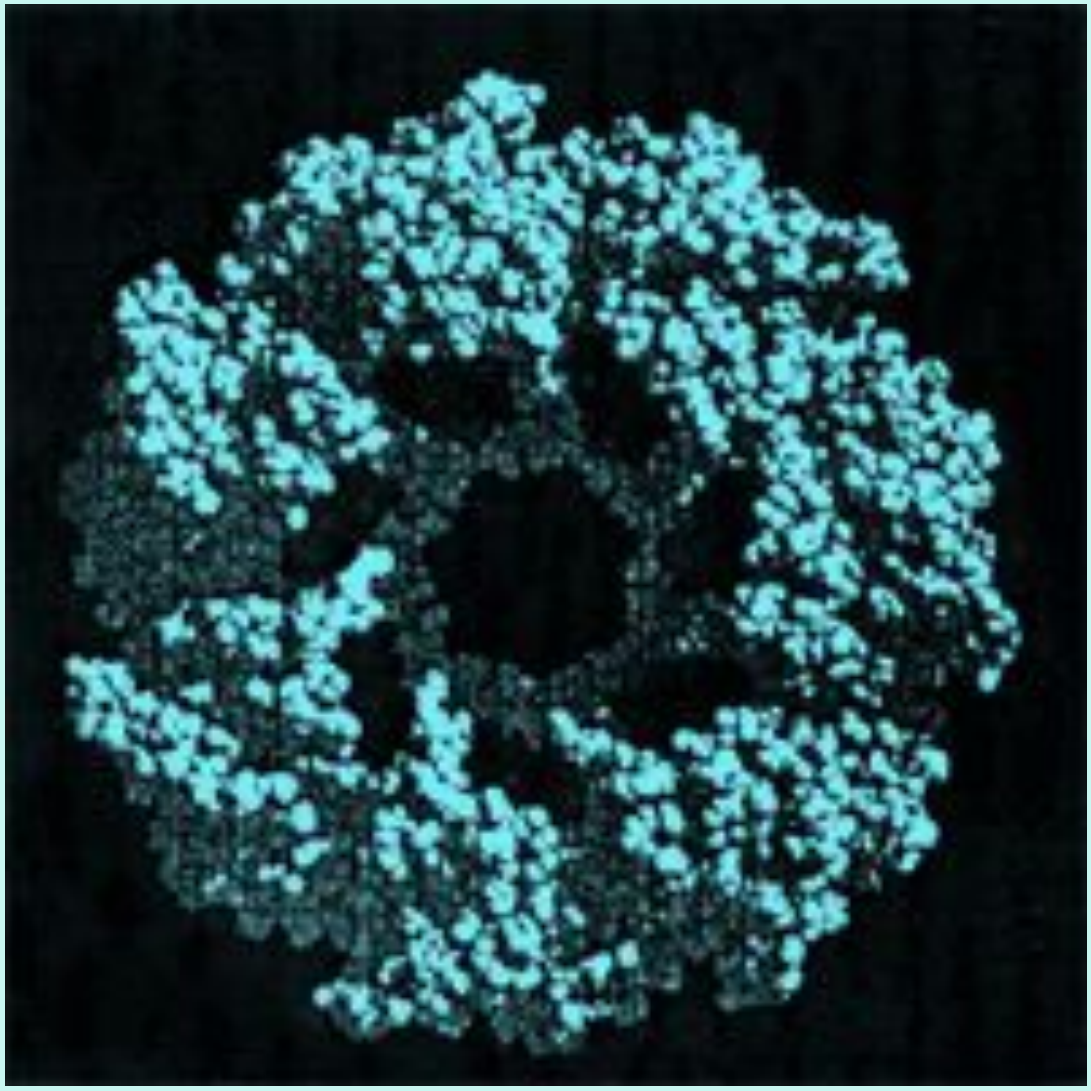

fMet-tRNA
Anticodon
UAC
AUG
5′
3′
mRNA
Codon
30S
50S
50S
fMet-tRNA
UAC
AUG
5′
3′
mRNA
30S

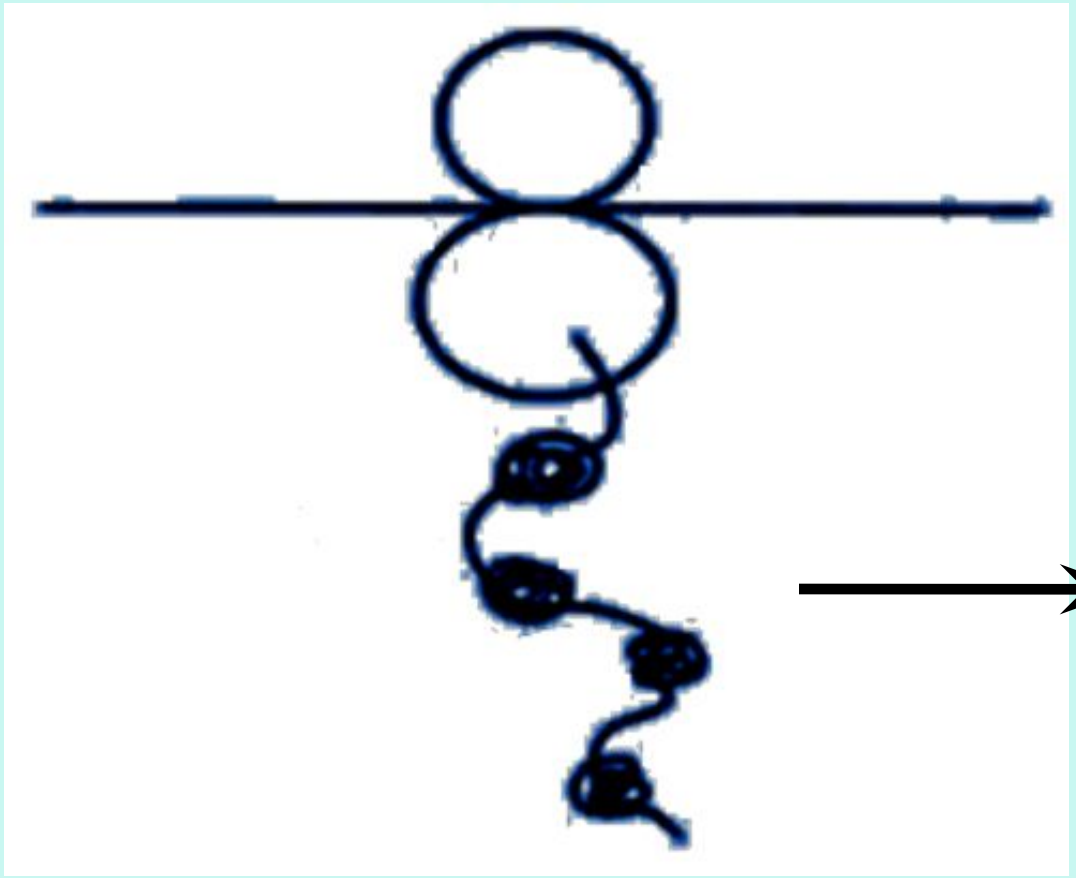
Amino acids corresponding to the codons are added to the growing protein chain.

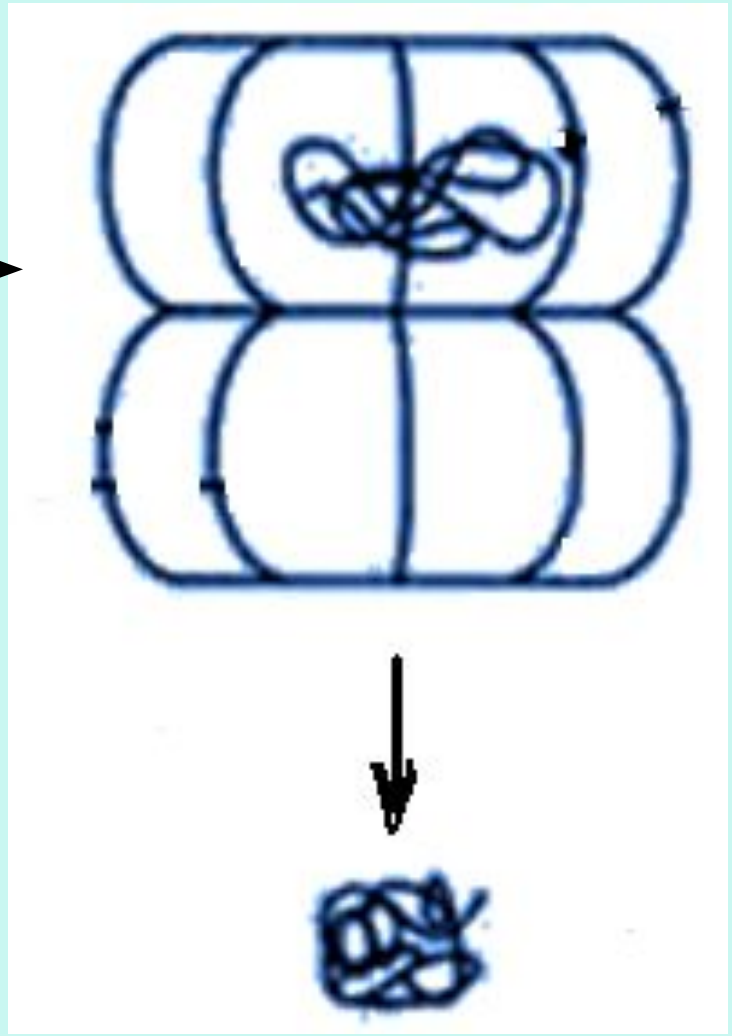



newly born protein
amino acids
large subunit
tRNA
P site
A site
mRNA
small subunit

Chaperone

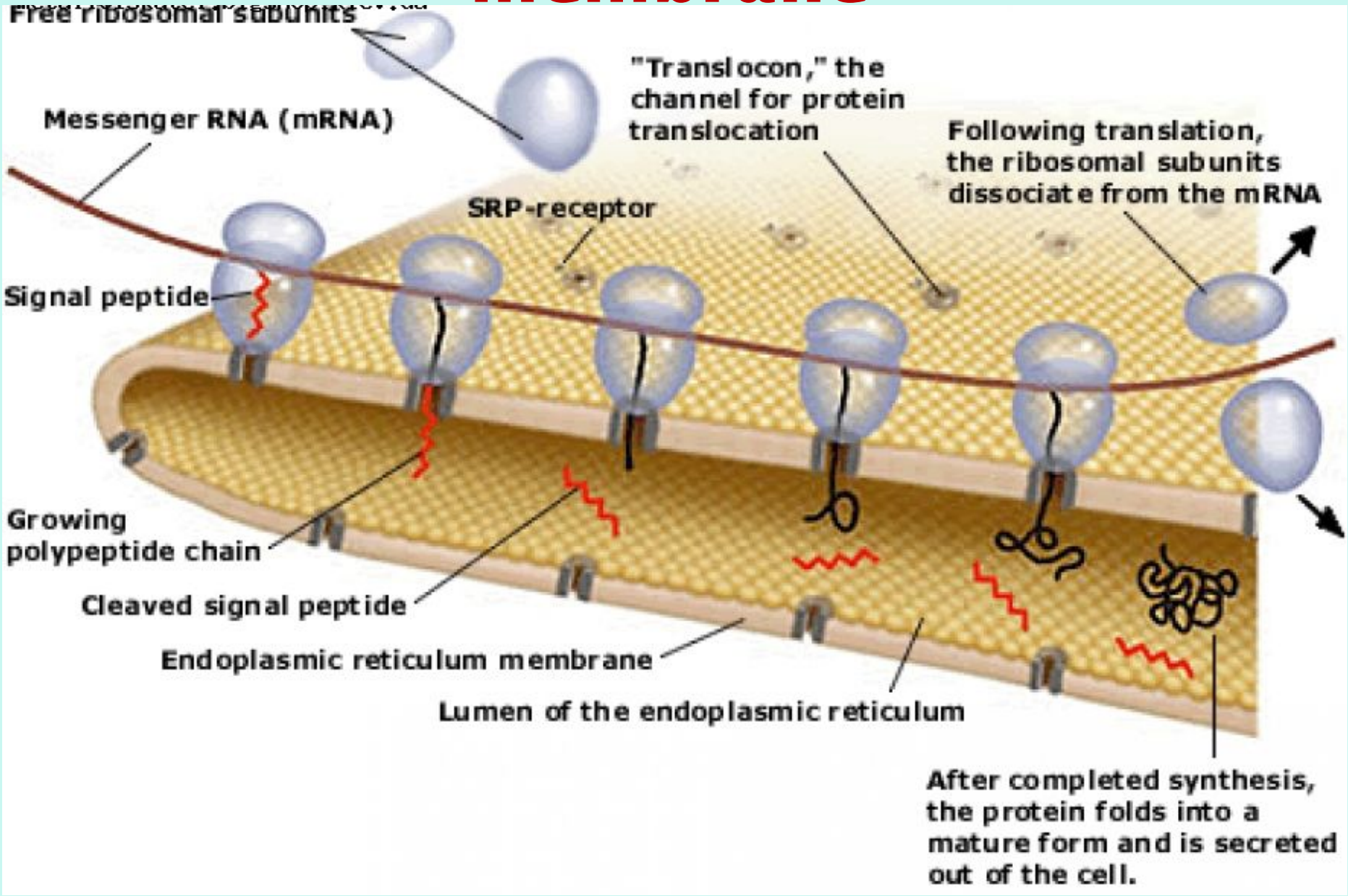




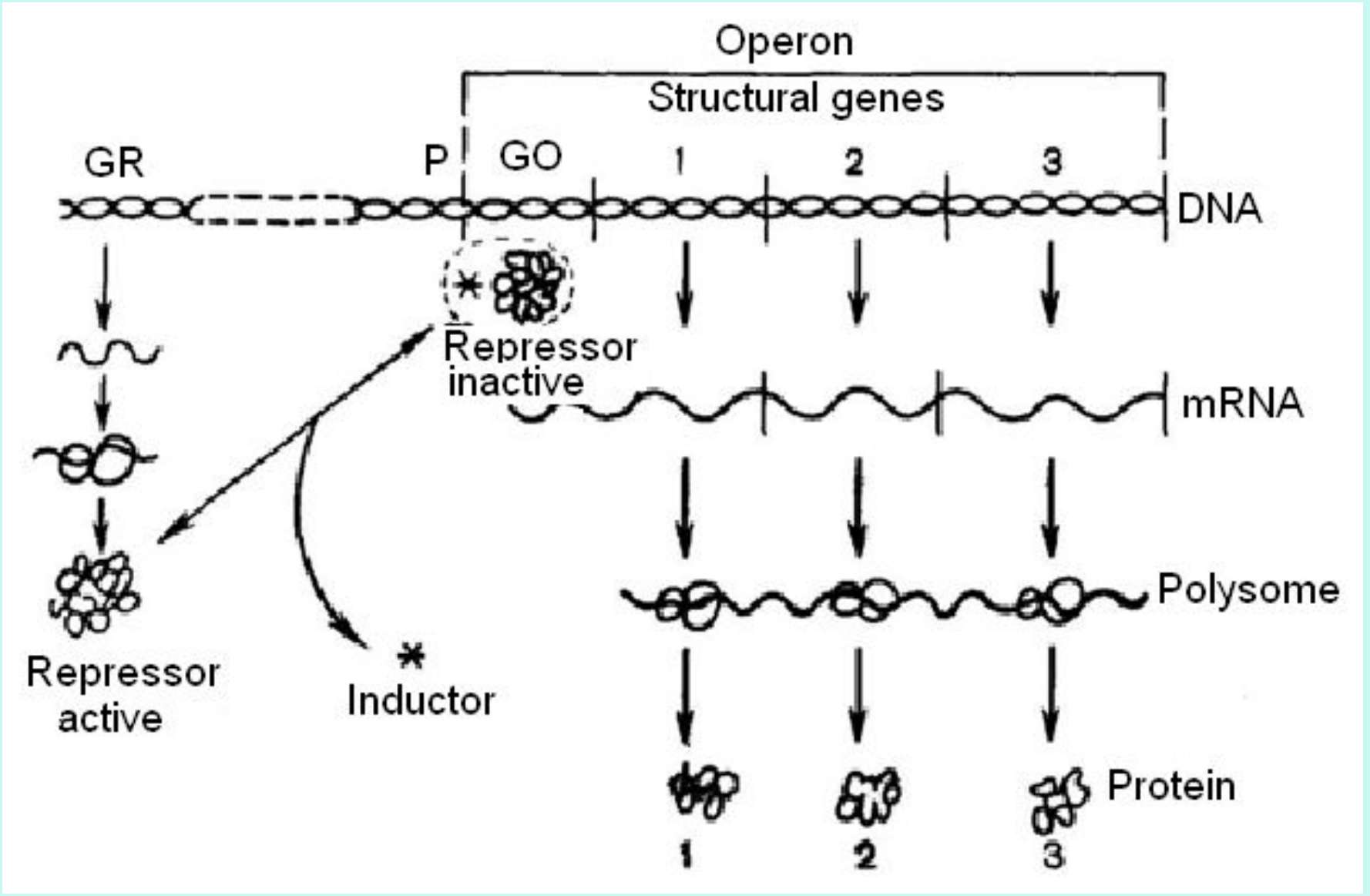


Participation of chaperones in protein foldin g

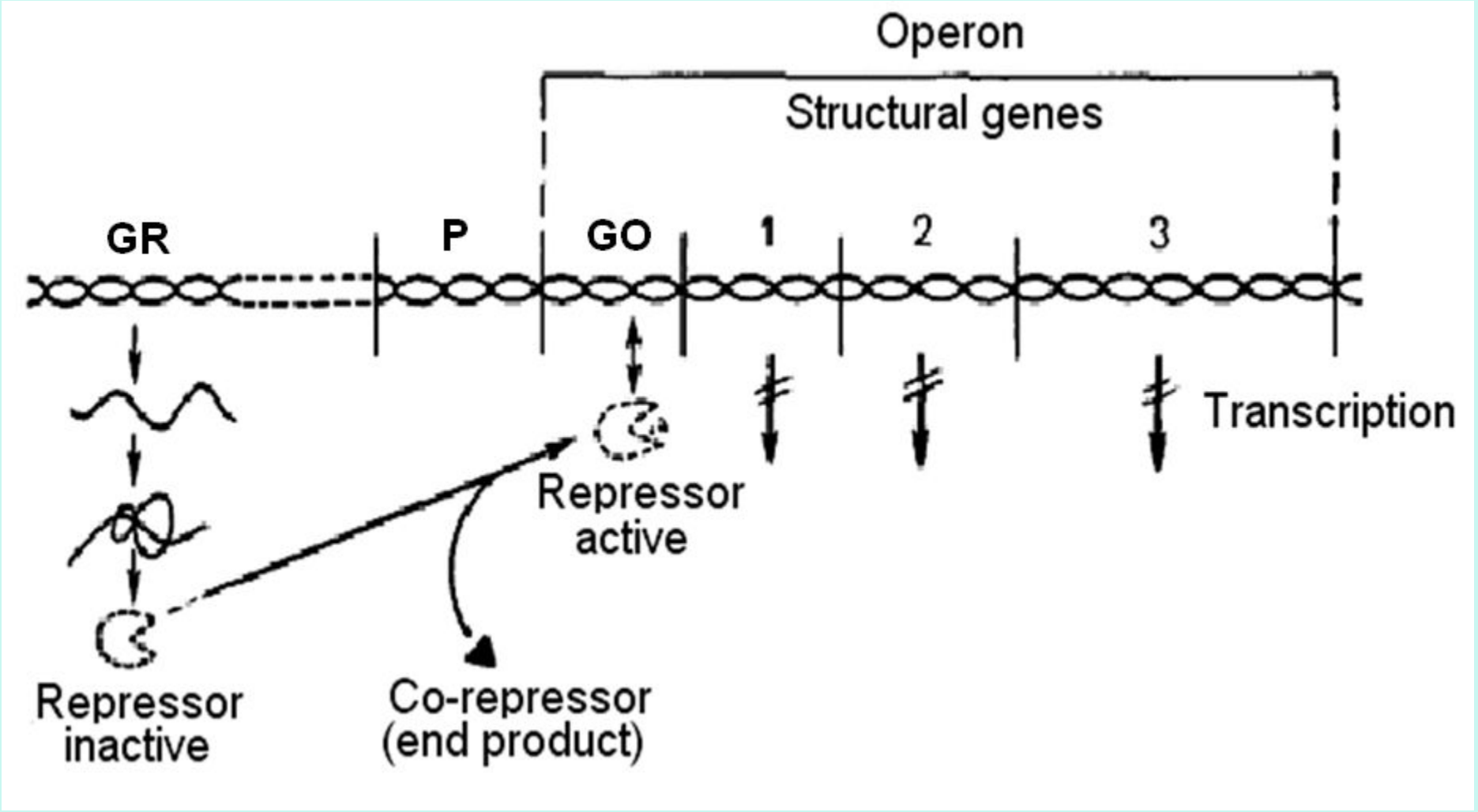
Transport of protein across membrane



Regulation of protein synthesis by induction

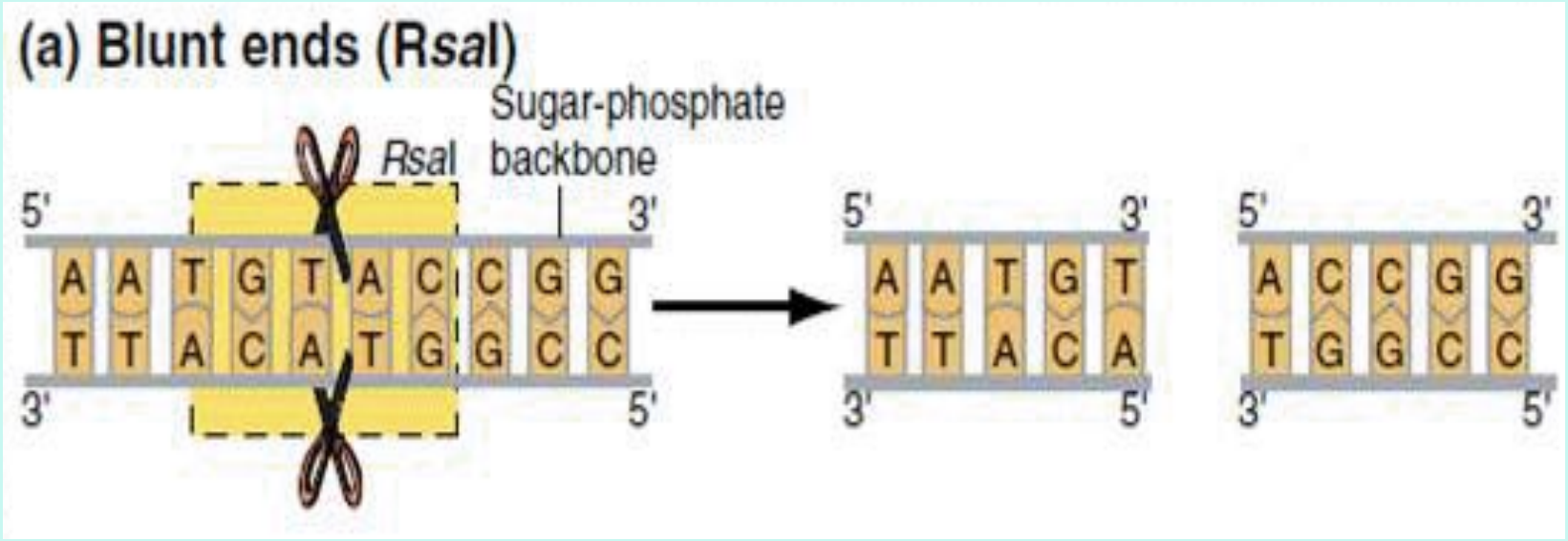


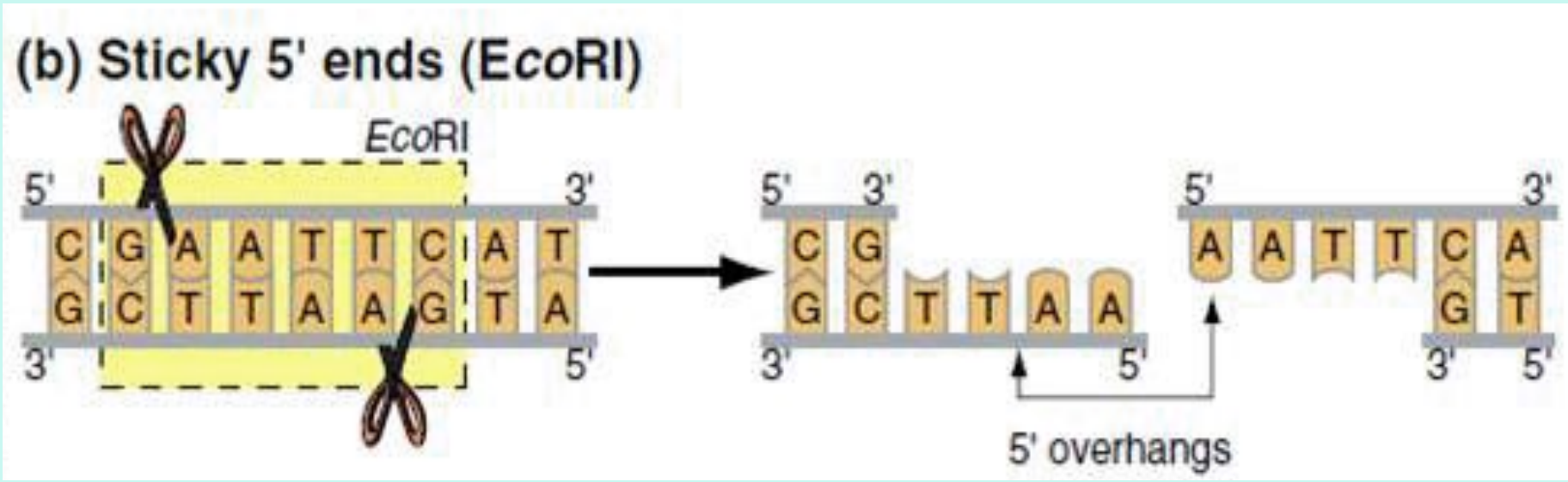
Regulation of protein synthesis by repression



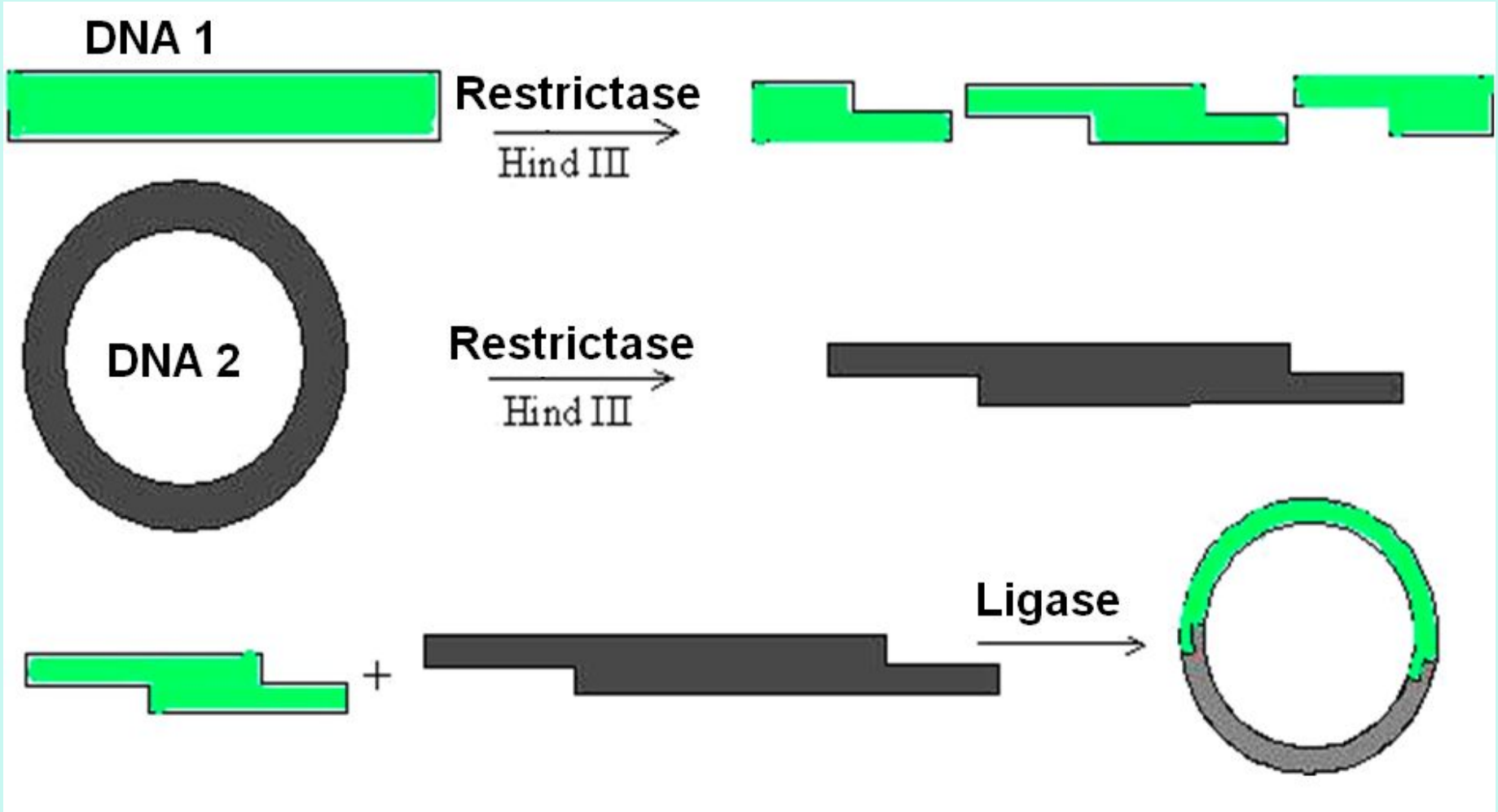
GENETIC ENGINEERING

Cleavage of DNA with restriction enzymes

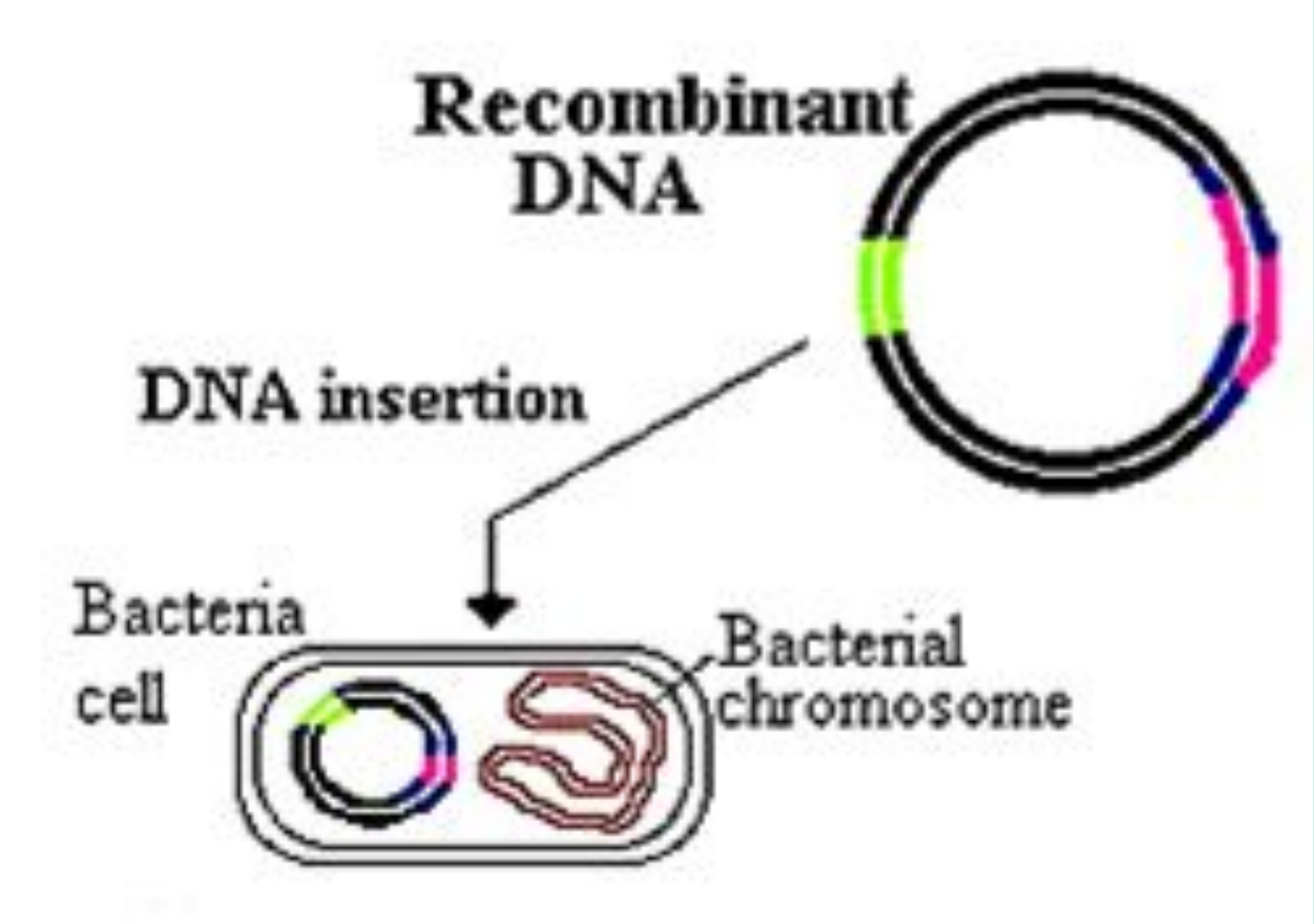


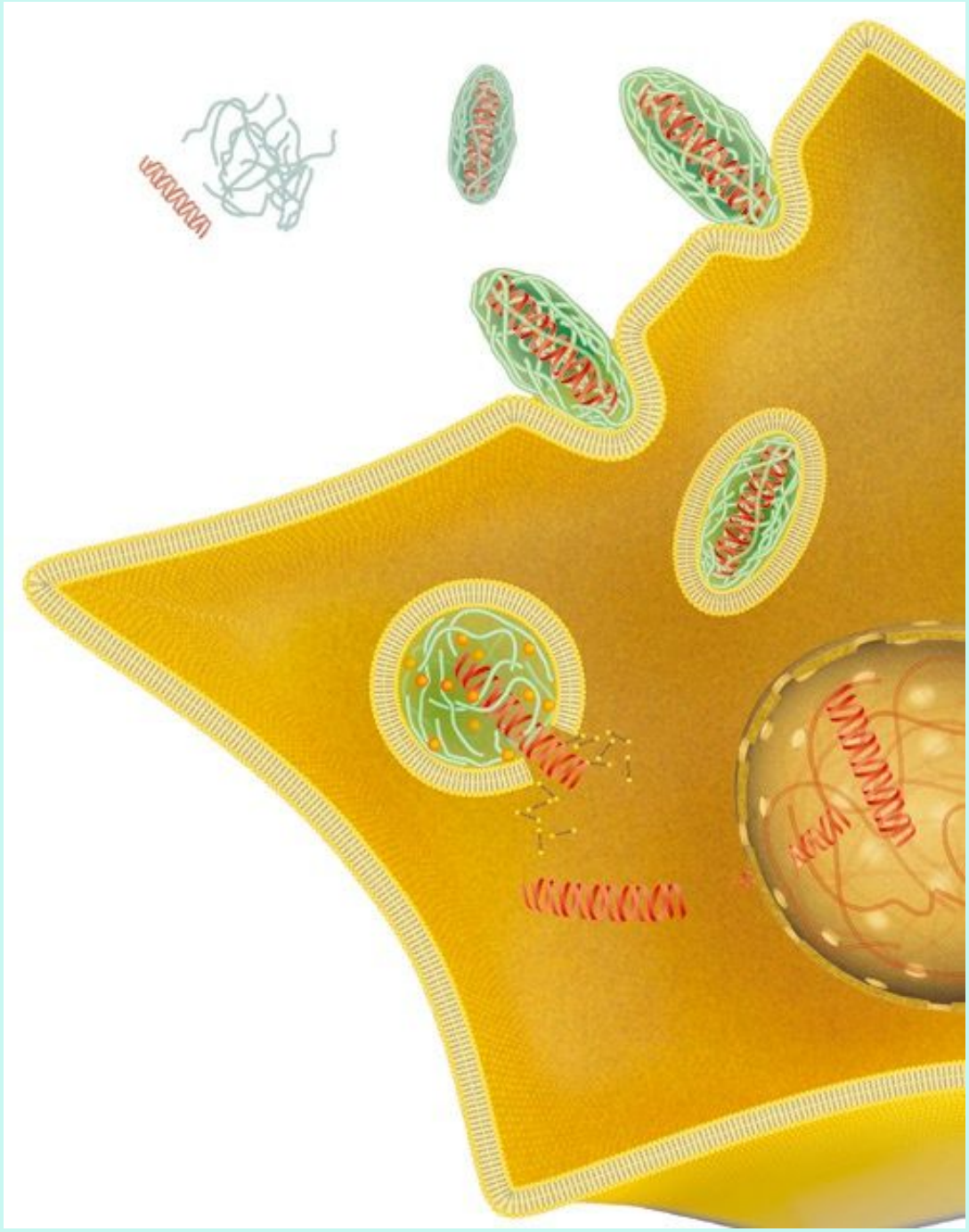


Construction of recombinant DNA



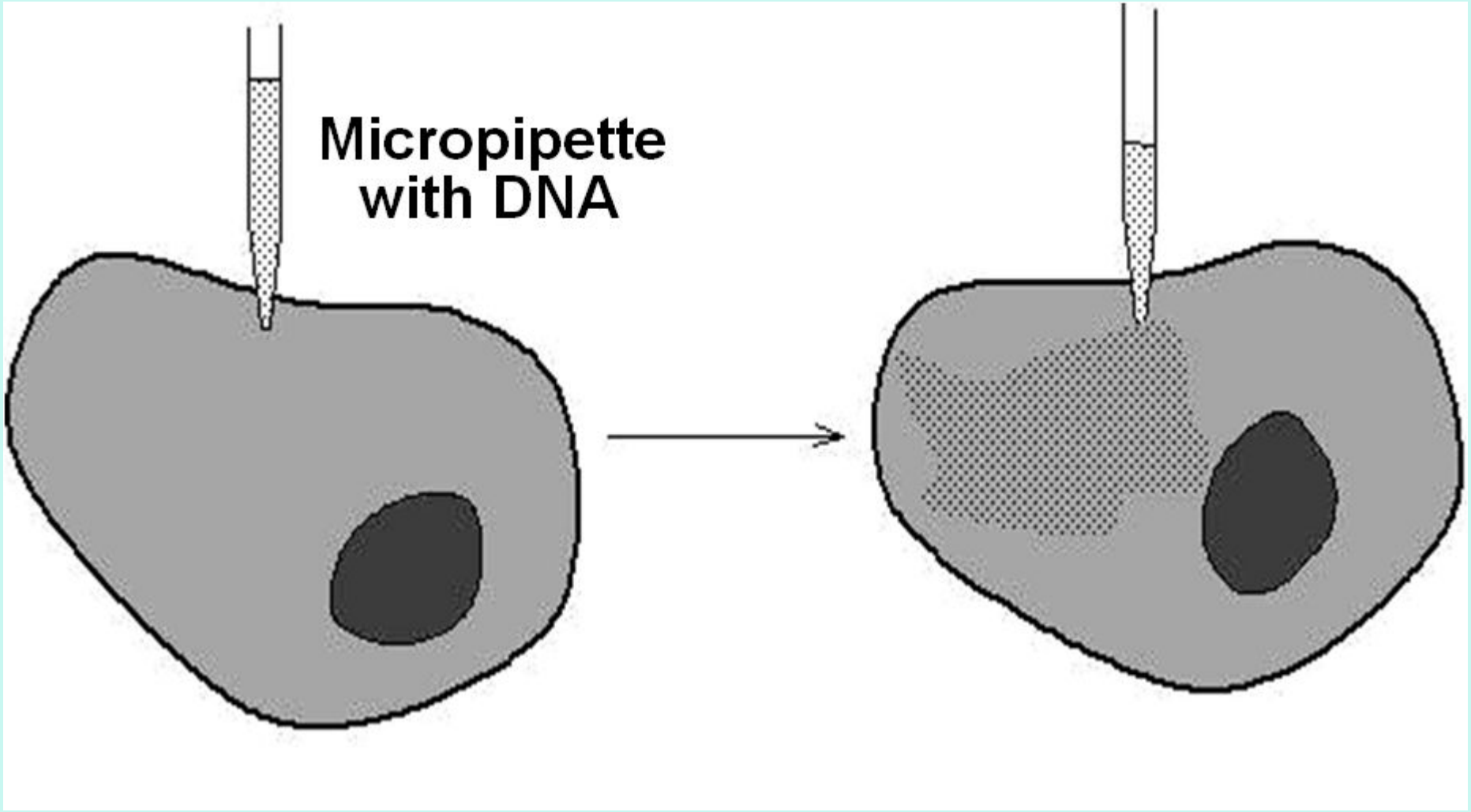
Introduction of DNA into the cell with plasmids



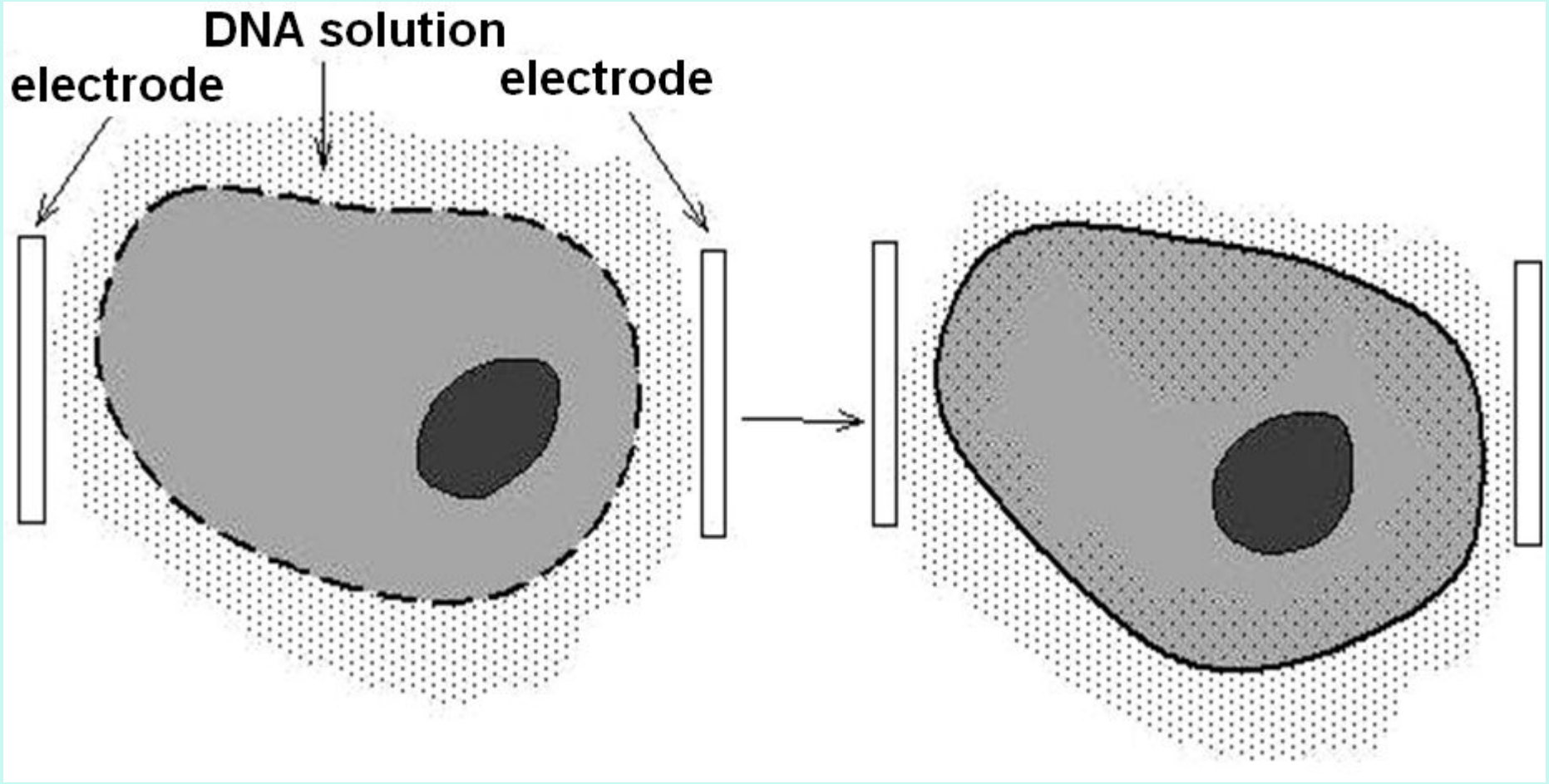


Transfection

Microinjection of DNA

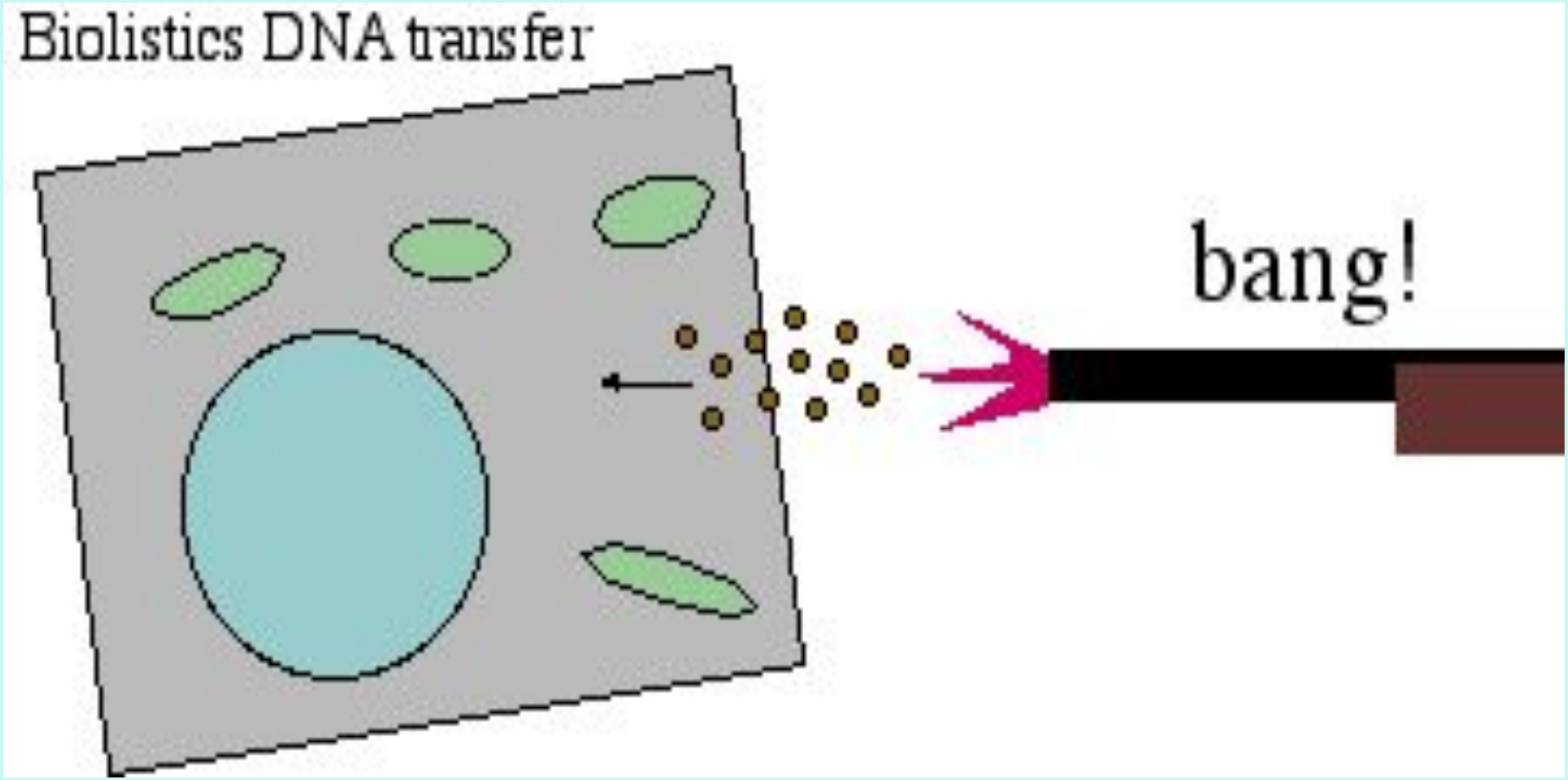


Electroporation

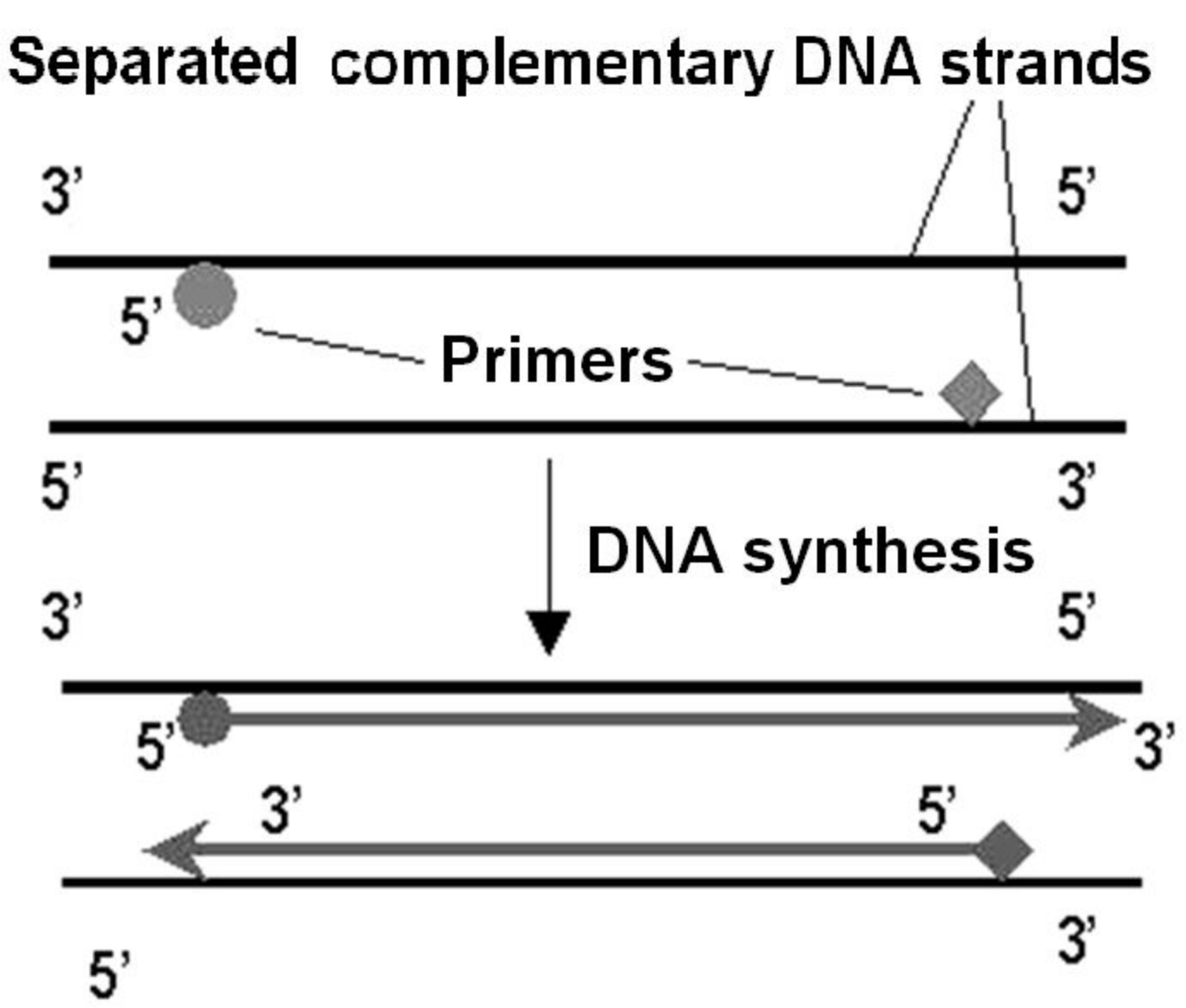


Packing in liposomes

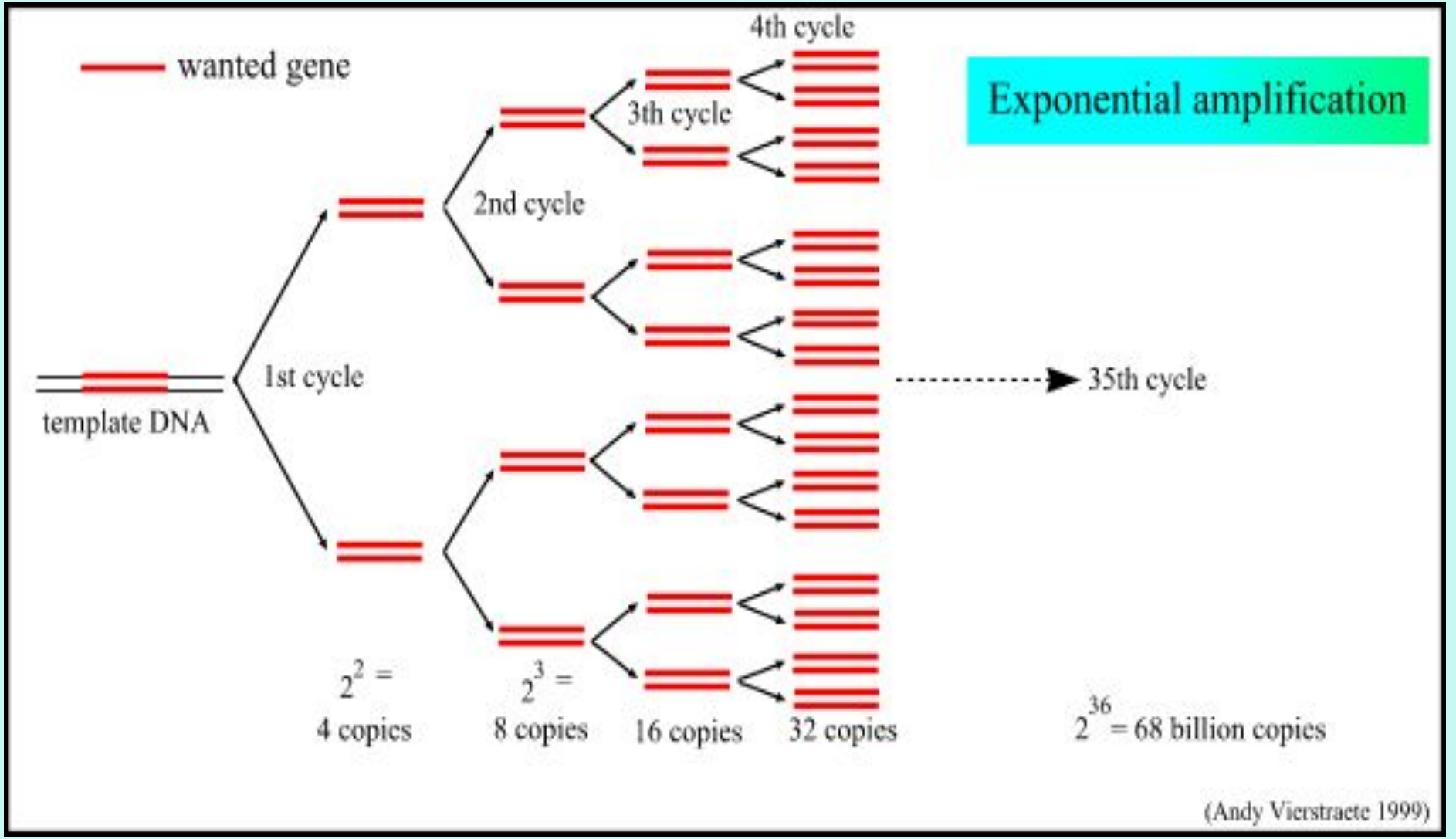
The method of biological ballistics



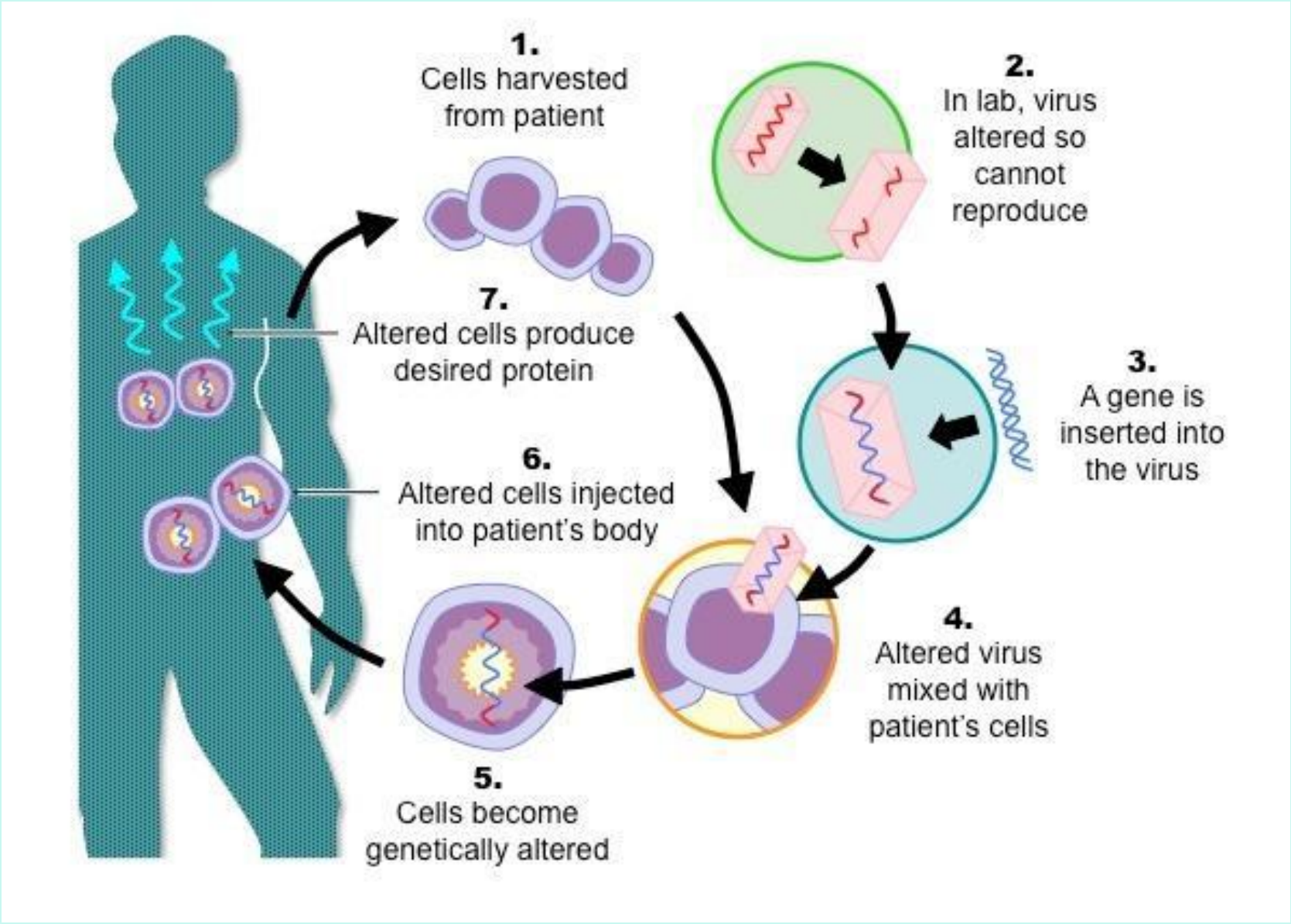
Polymerase chain reaction (PCR)



Polymerase chain reaction
DNA amplification



Gene Therapy



Treatment with Gene Therapy