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Nucleic Acids

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1. Nucleic Acids
2. Proteins
3. Lipids
4. Carbohydrates

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Also DNA indicates all biological characteristics of cells such as shape, activities and interactions with other cells and their environment.

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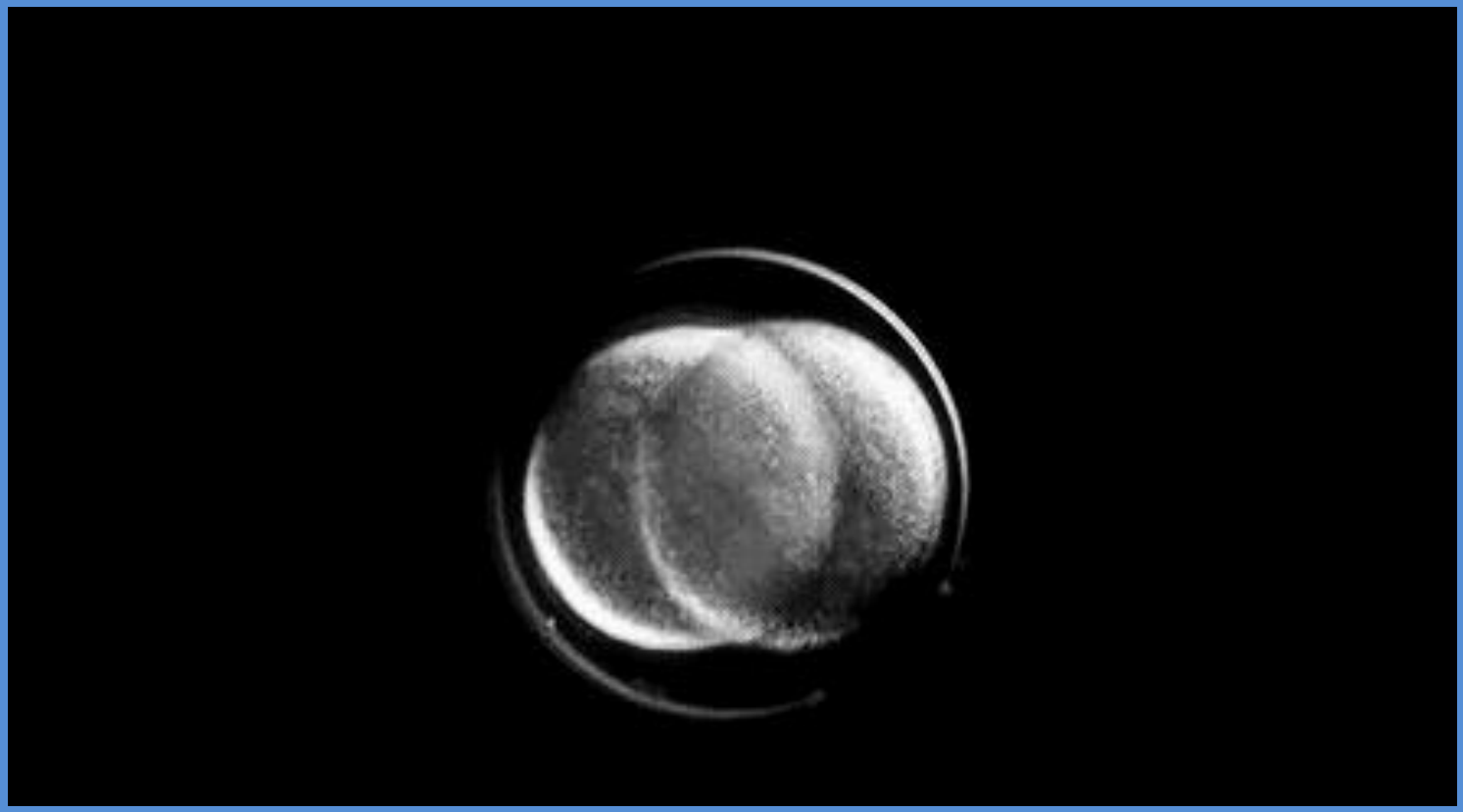

and transfers genetic information to the daughter cells during cell division.

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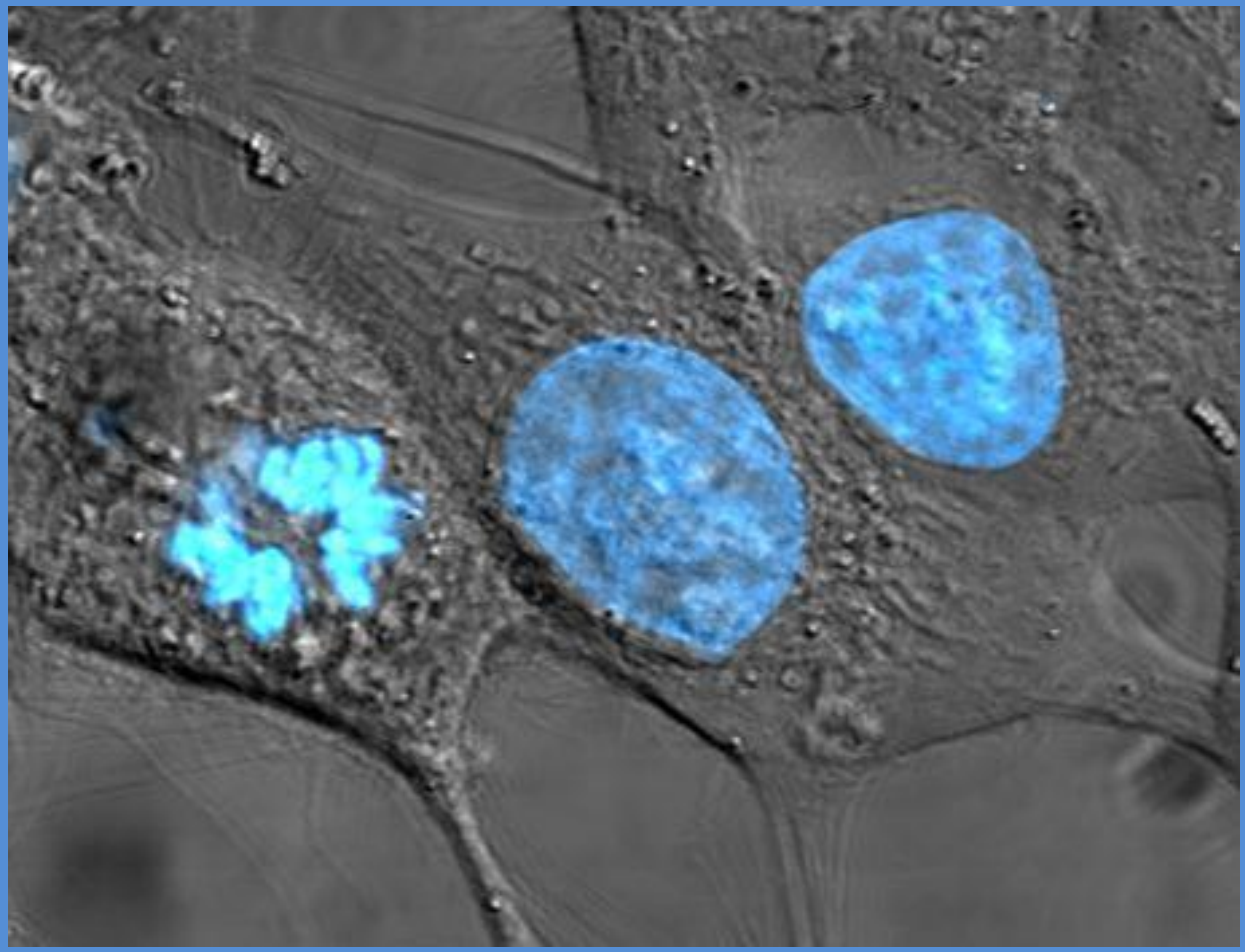
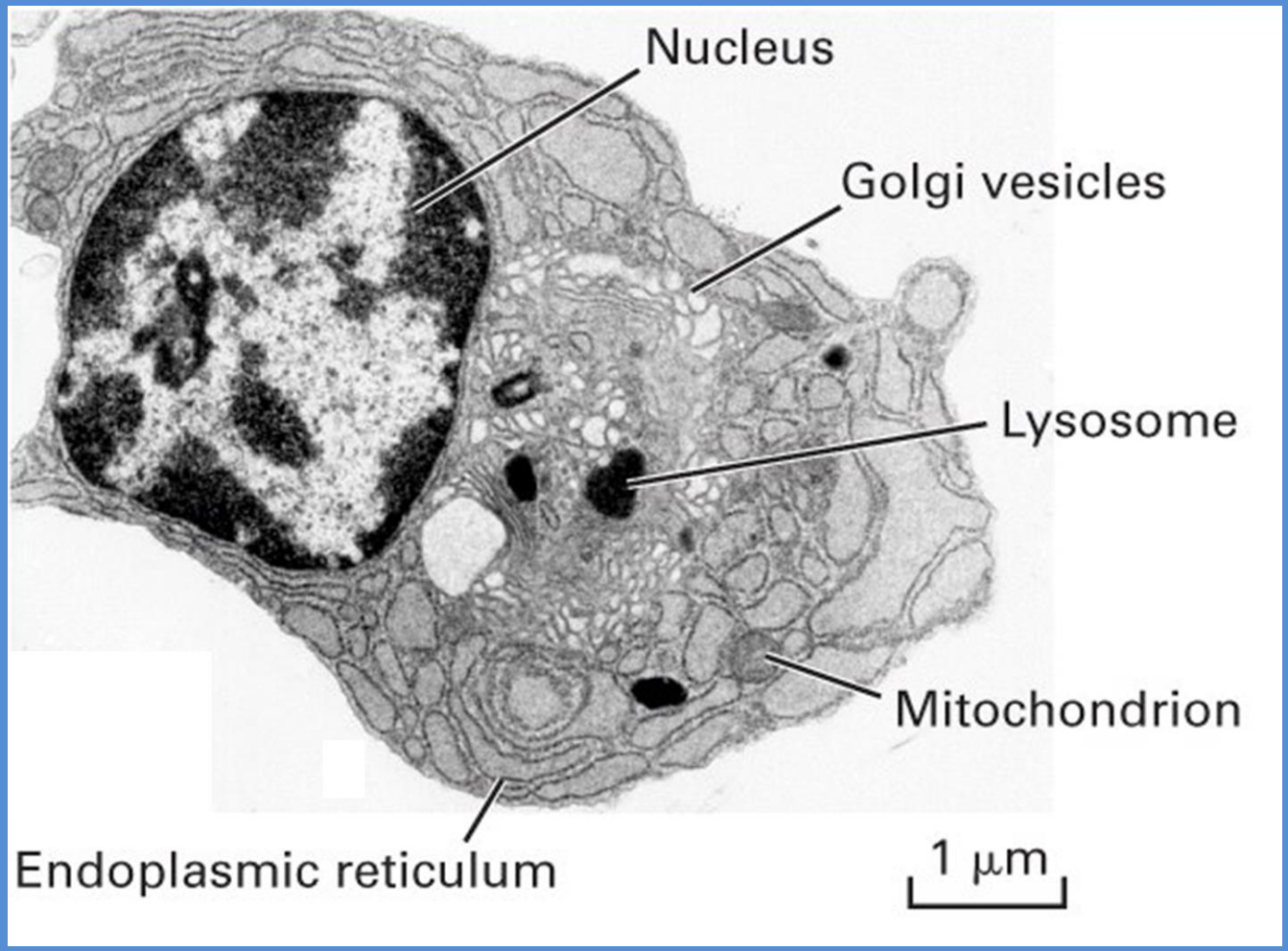
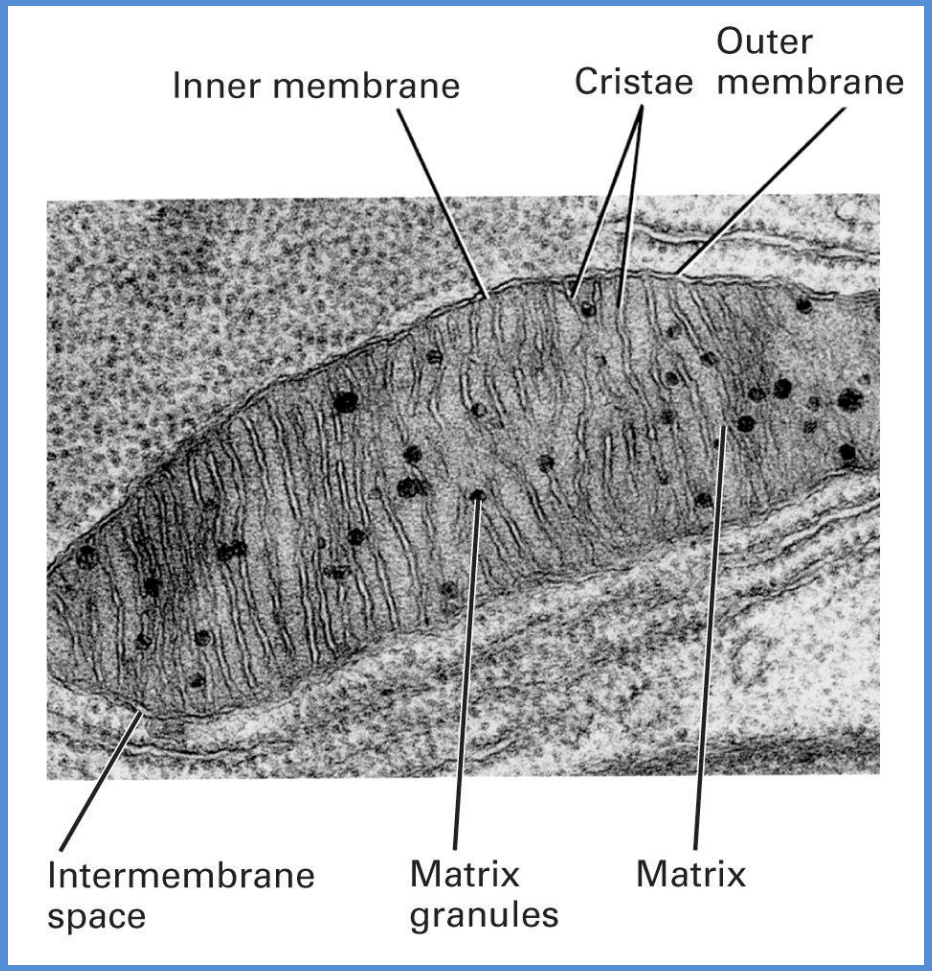


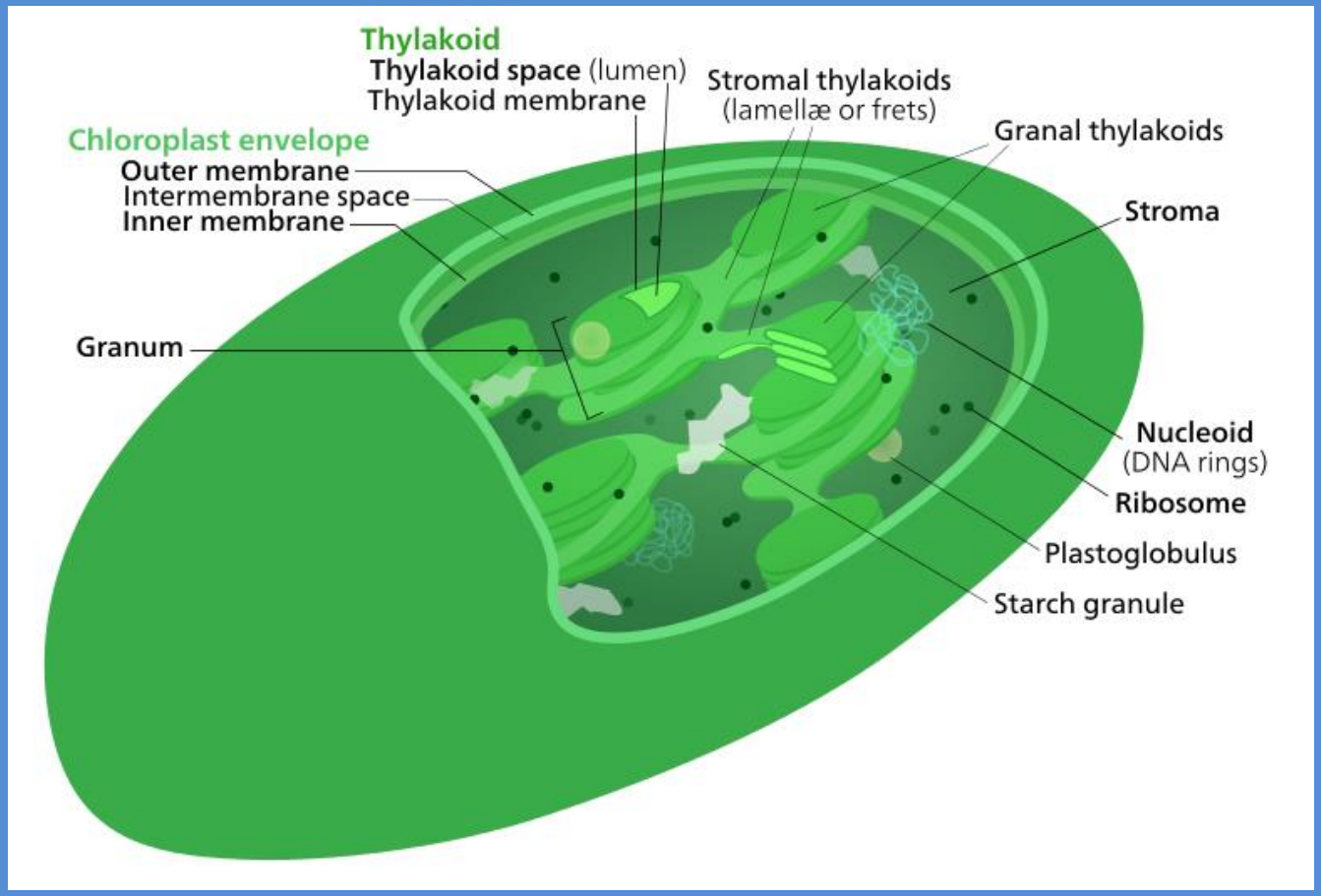
Our story begins in the nucleus of cell.



DNA as an information biopolymer is located in the cell nucleus.



In eukaryotic cells, in addition to nucleus, nucleic acids exist in cellular organelles such as mitochondrion, the powerhouse of cells.



and chloroplast, an organelle for photosynthesis in plant cells

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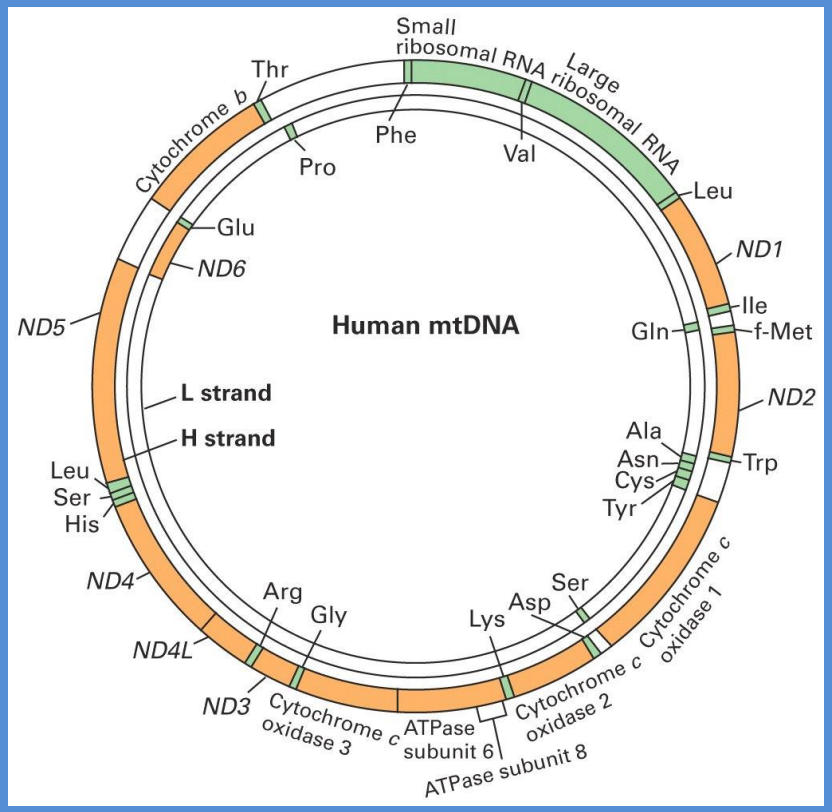
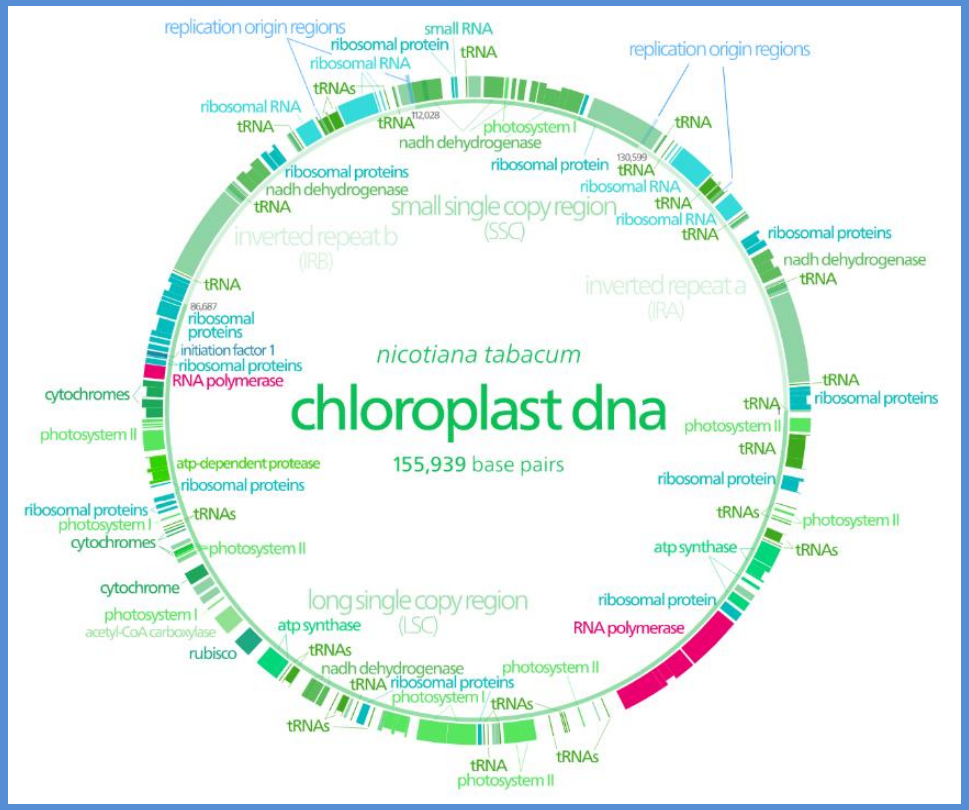
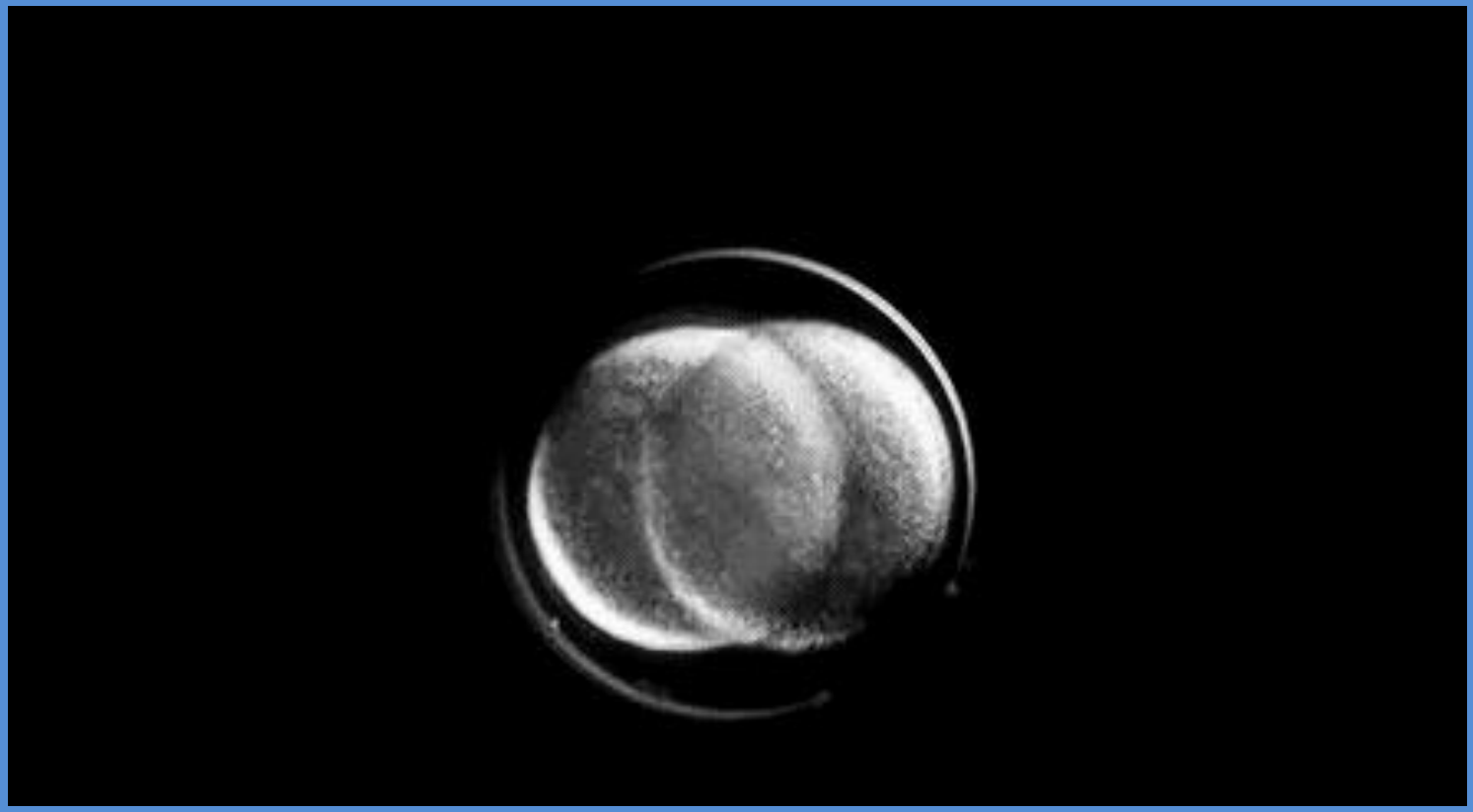




These organelles contain circular DNA.



and transfers genetic information to the daughter cells during cell division.

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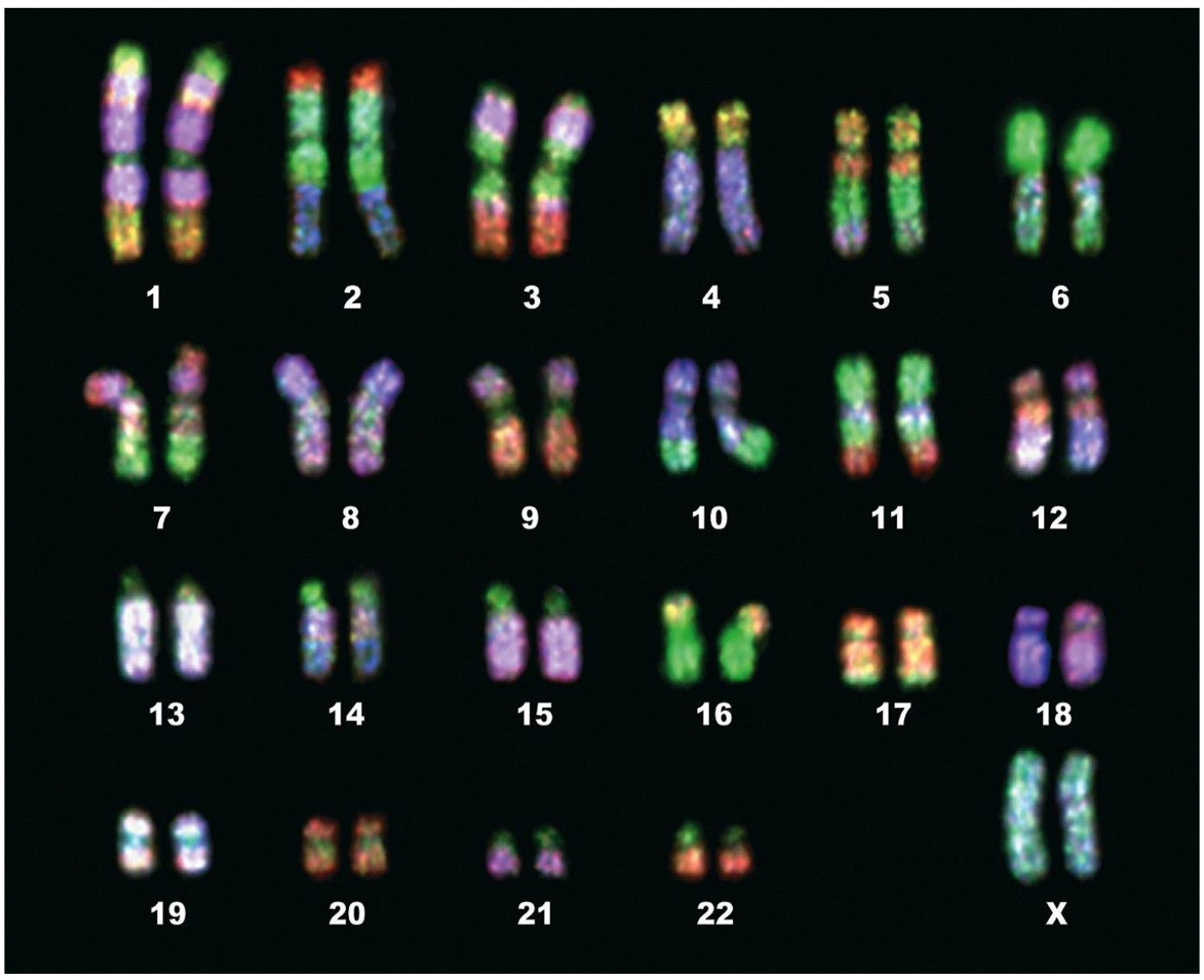

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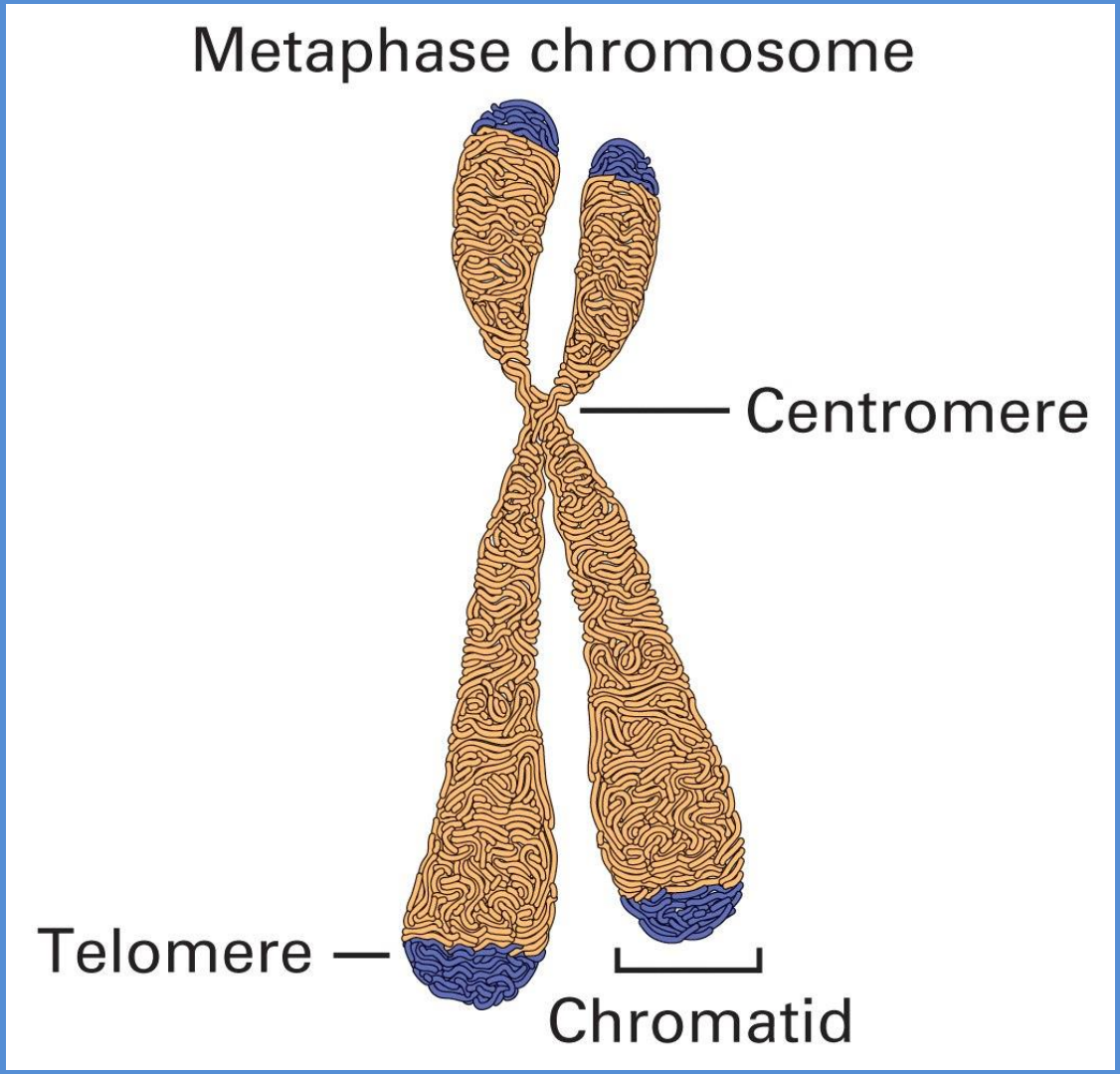
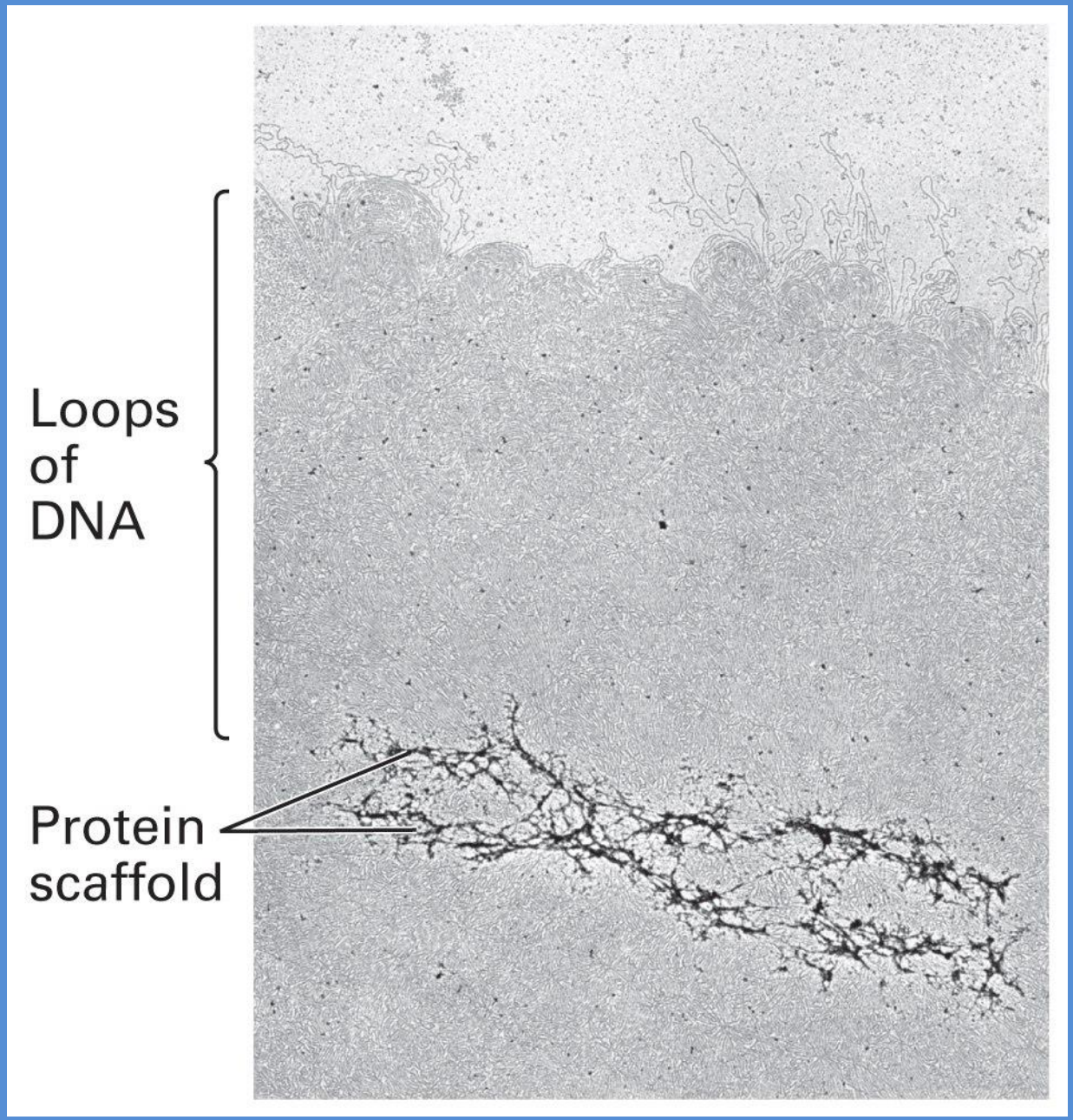
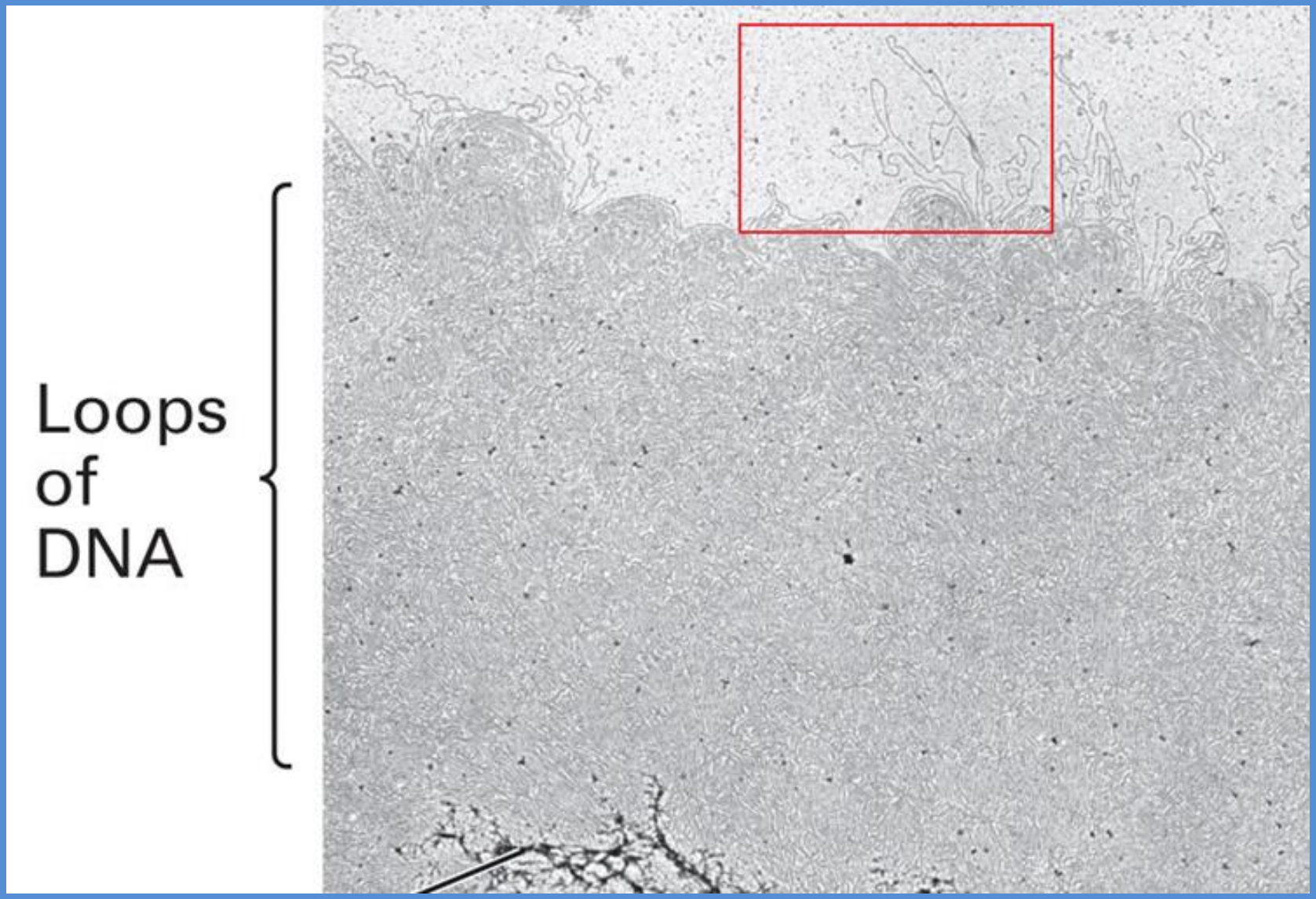
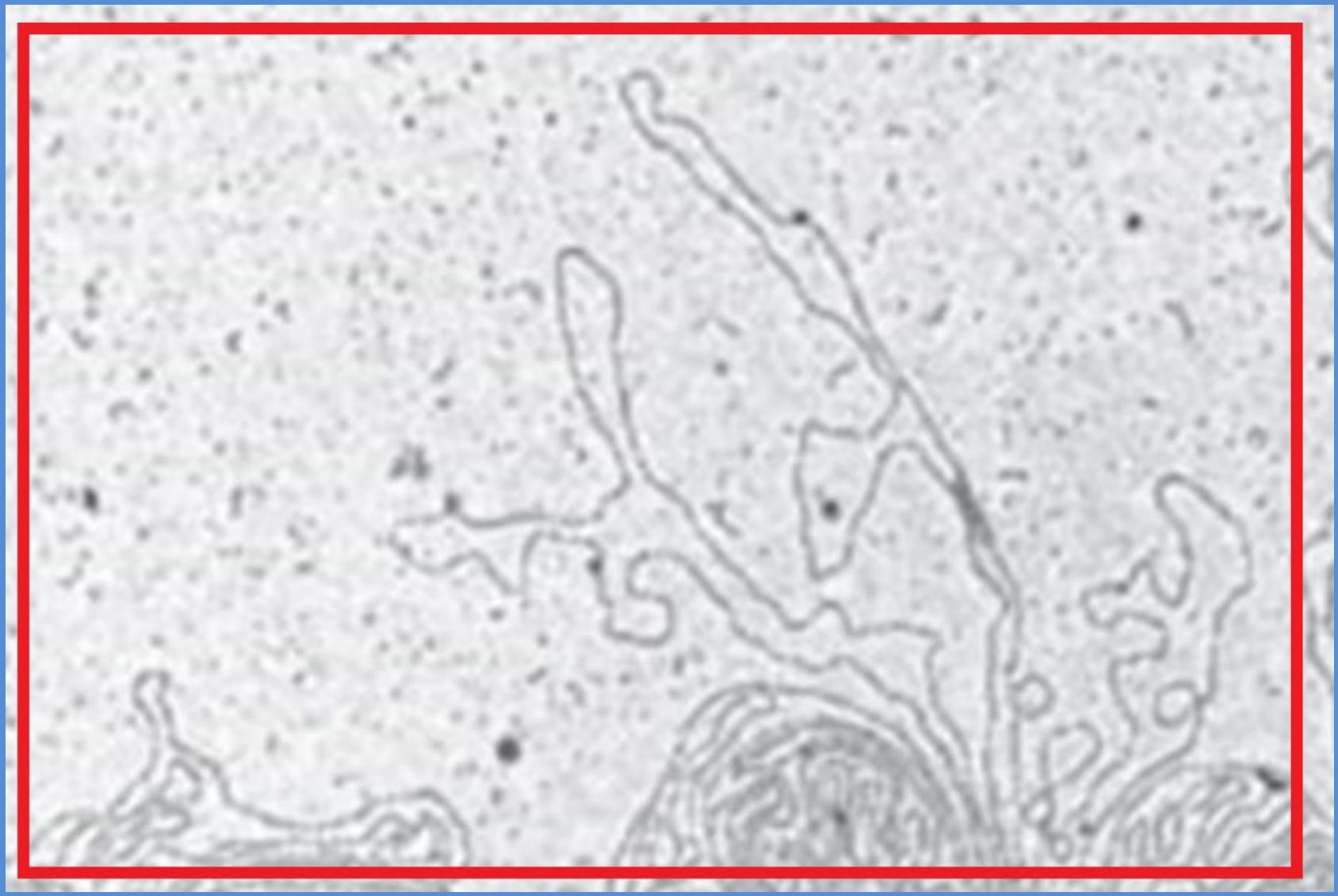
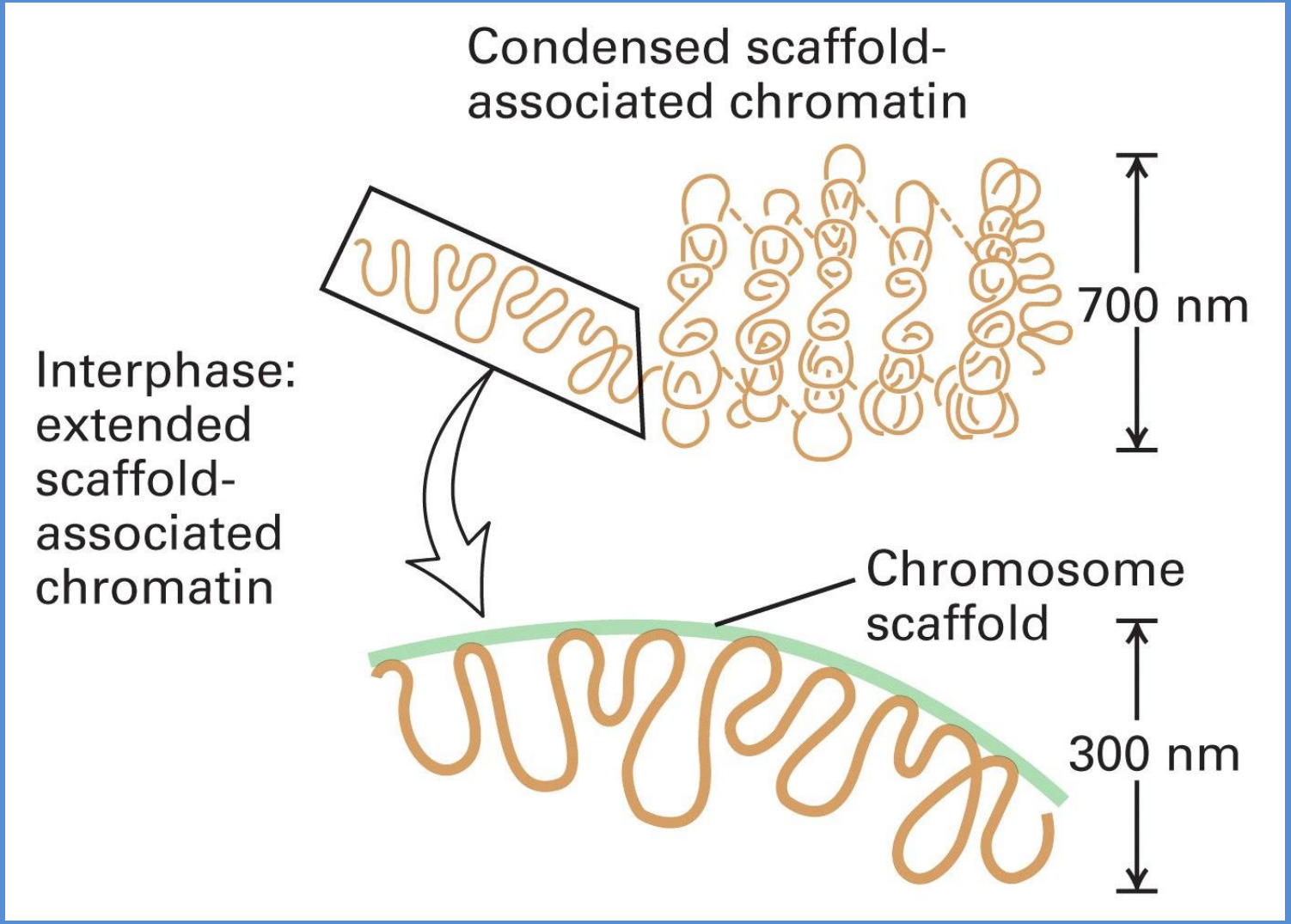
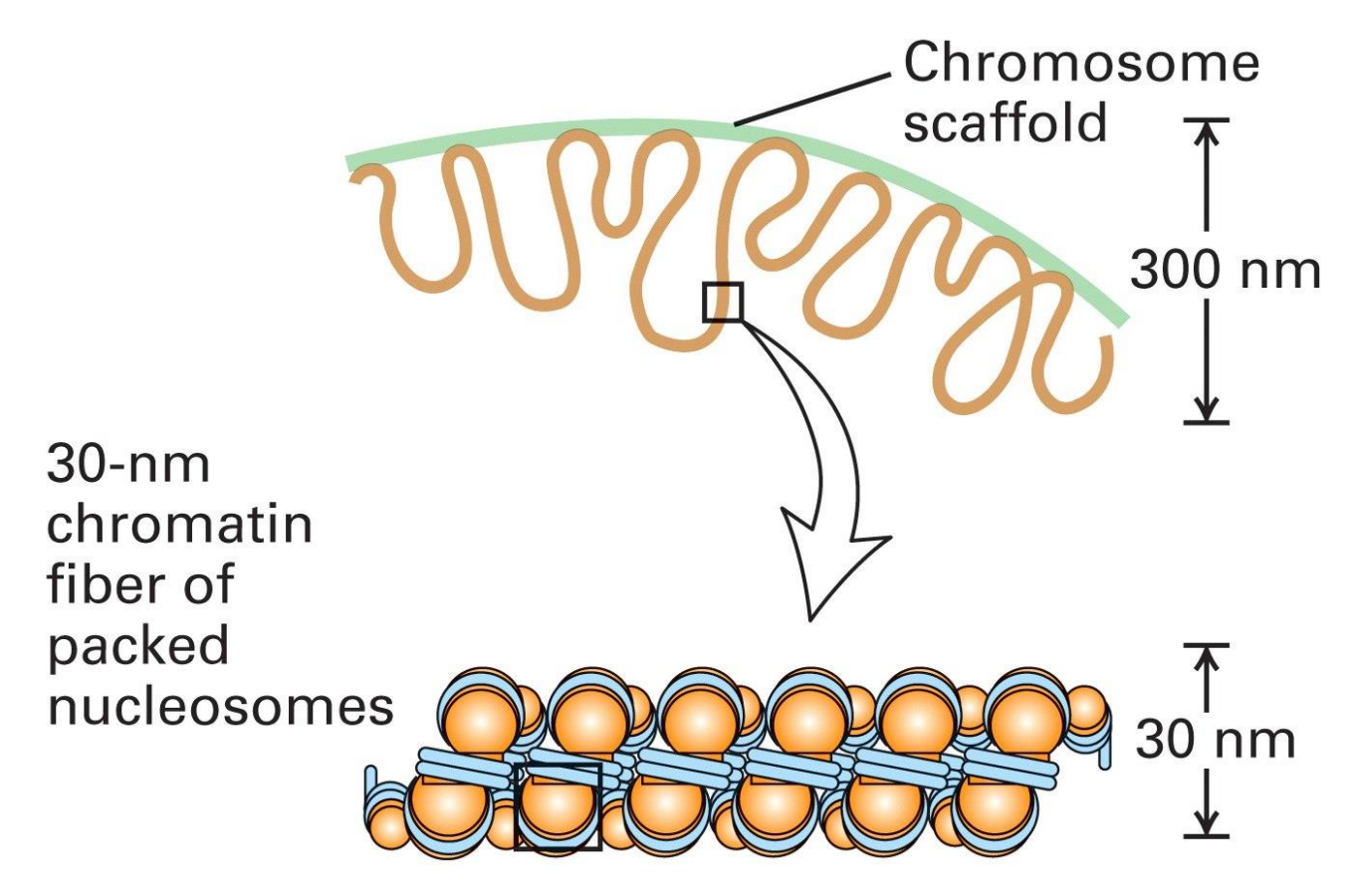

Metaphase chromosome
Centromere
Telomere
Chromatid

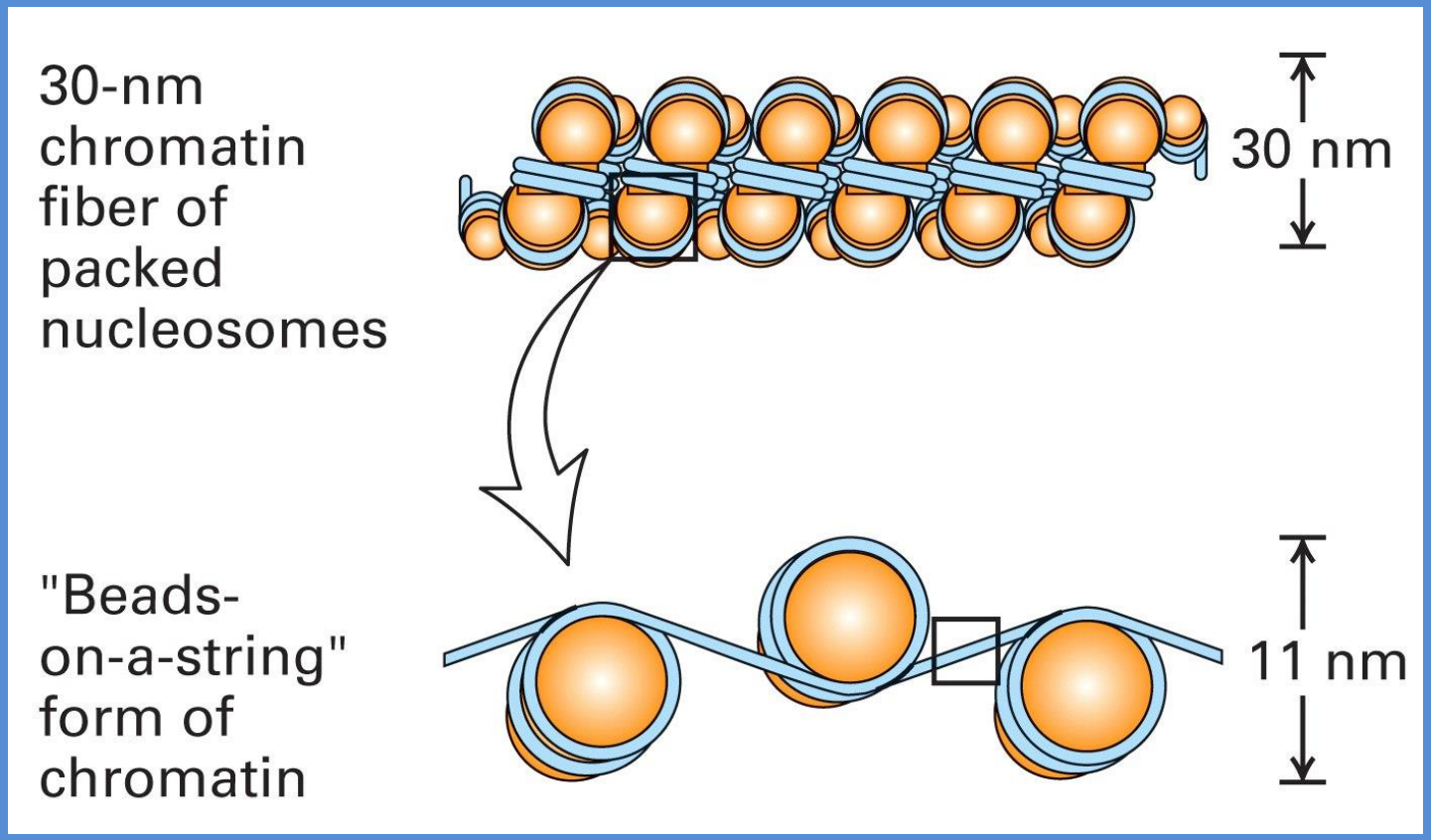

Loops of DNA
Protein scaffold


Loops
of
DNA

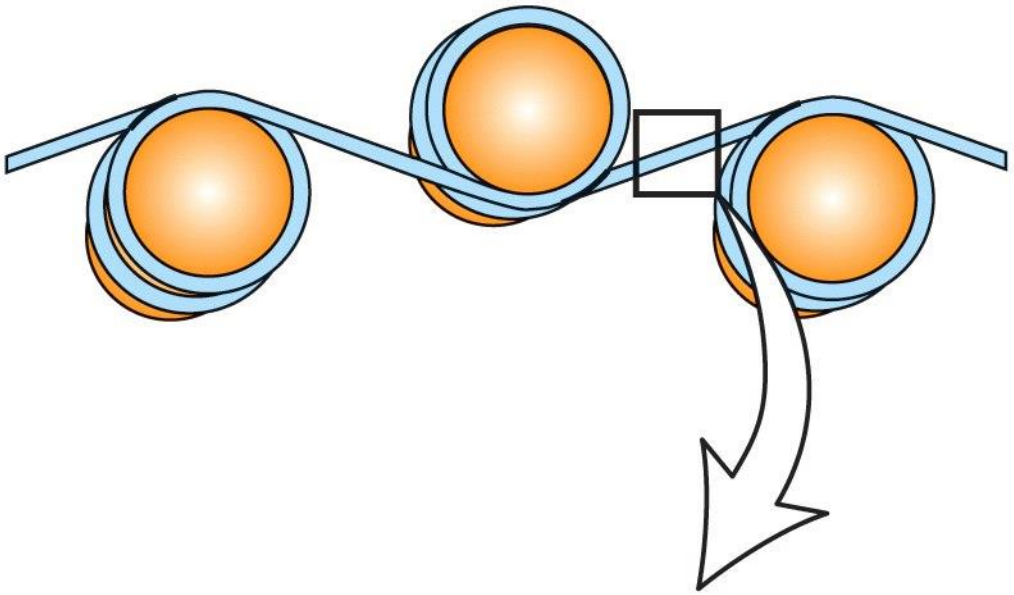



Condensed scaffold-associated chromatin
700 nm
Interphase: extended scaffold-associated chromatin
Chromosome scaffold
300 nm

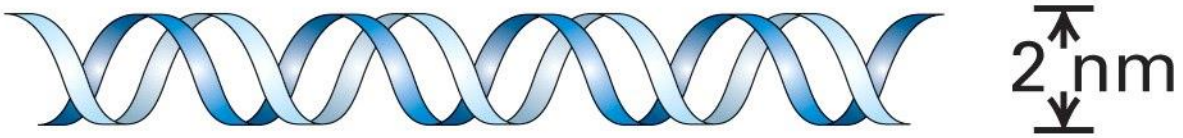

Chromosome scaffold
300 nm
30-nm chromatin fiber of packed nucleosomes
30 nm


30-nm chromatin fiber of packed nucleosomes
30 nm
"Beads-on-a-string" form of chromatin
11 nm

"Beads-on-a-string" form of chromatin



Short region of DNA double helix



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Researches on nucleic acids were continued and led to the discovery of deoxyribonucleic acid or DNA.

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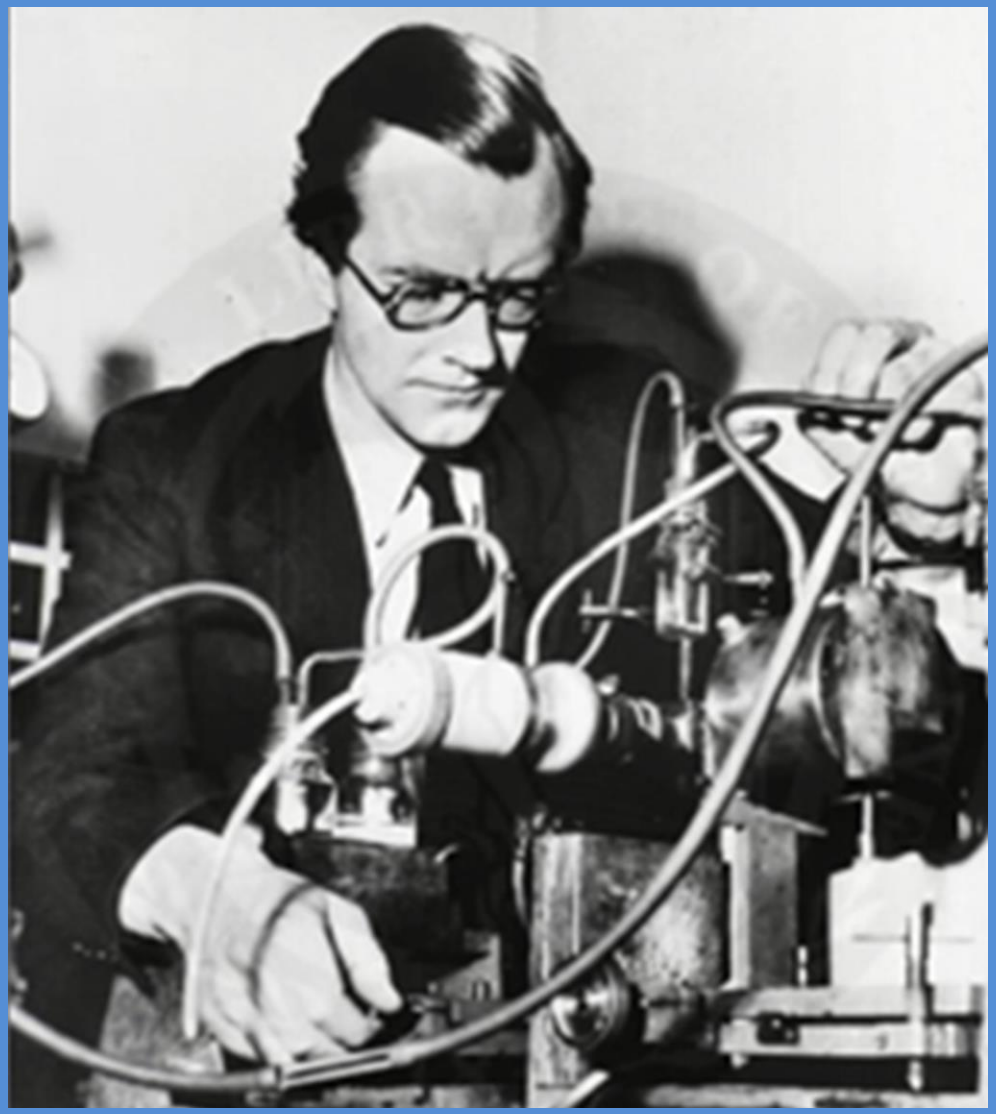
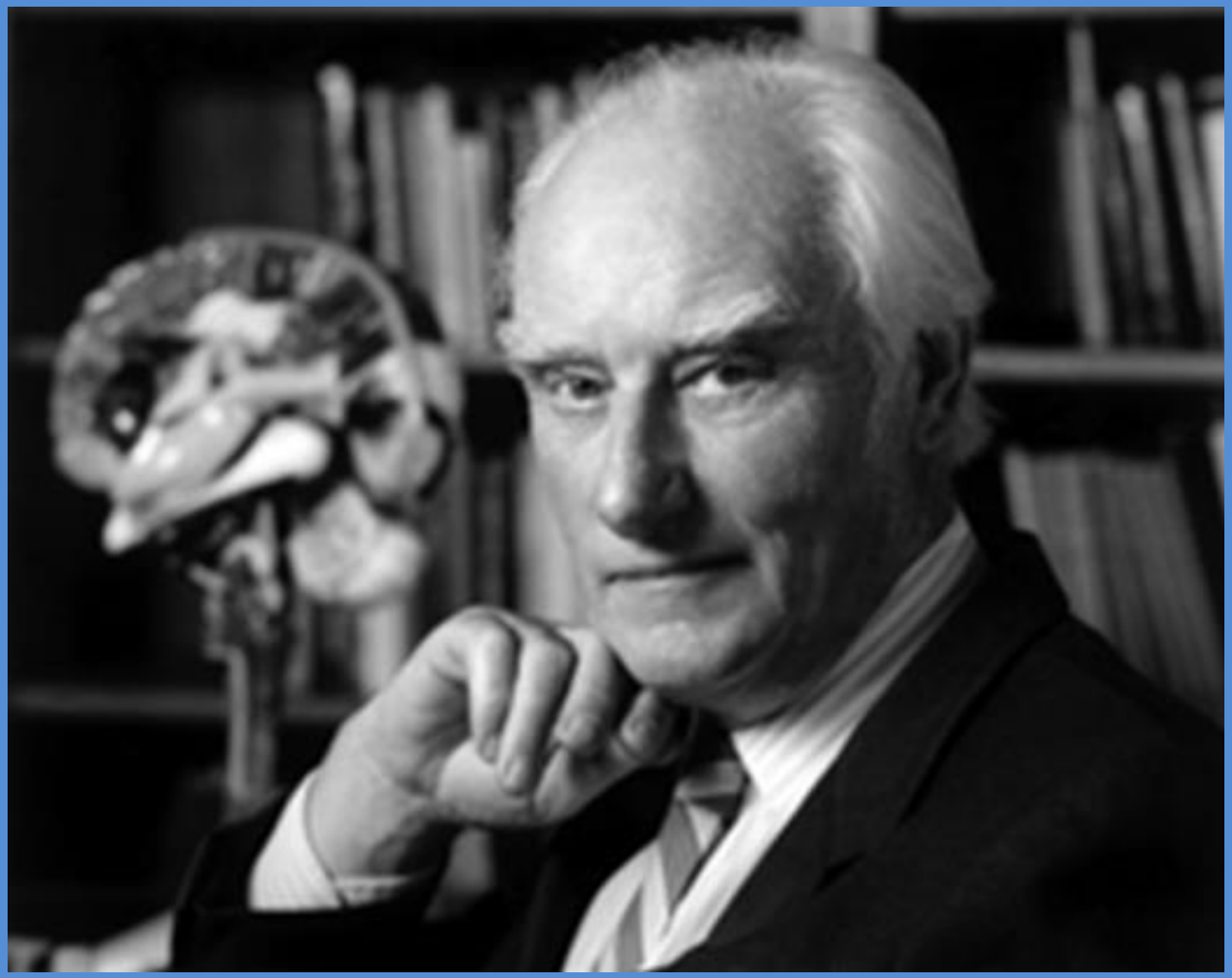
Rosalind Franklin



Maurice Hugh Frederick Wilkins



Francis Harry Compton Crick

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James Dewey Watson

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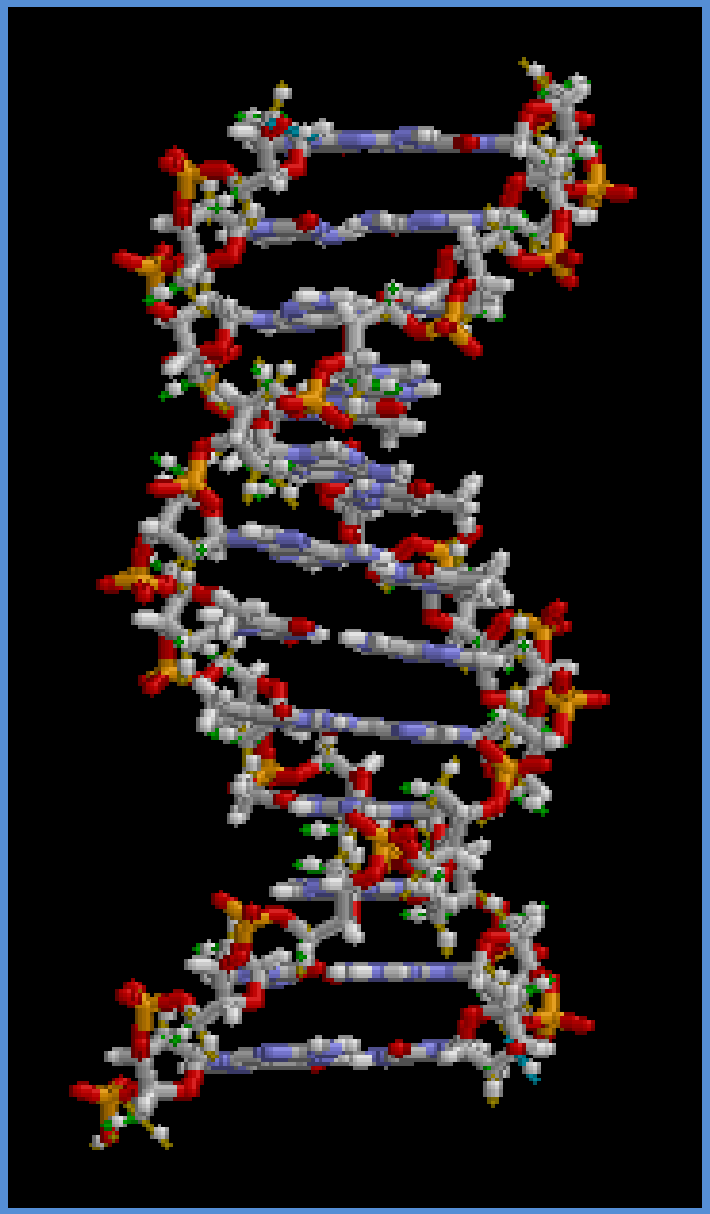

DNA is a polymer of nucleotides and has a three dimensional structure of double-helix.

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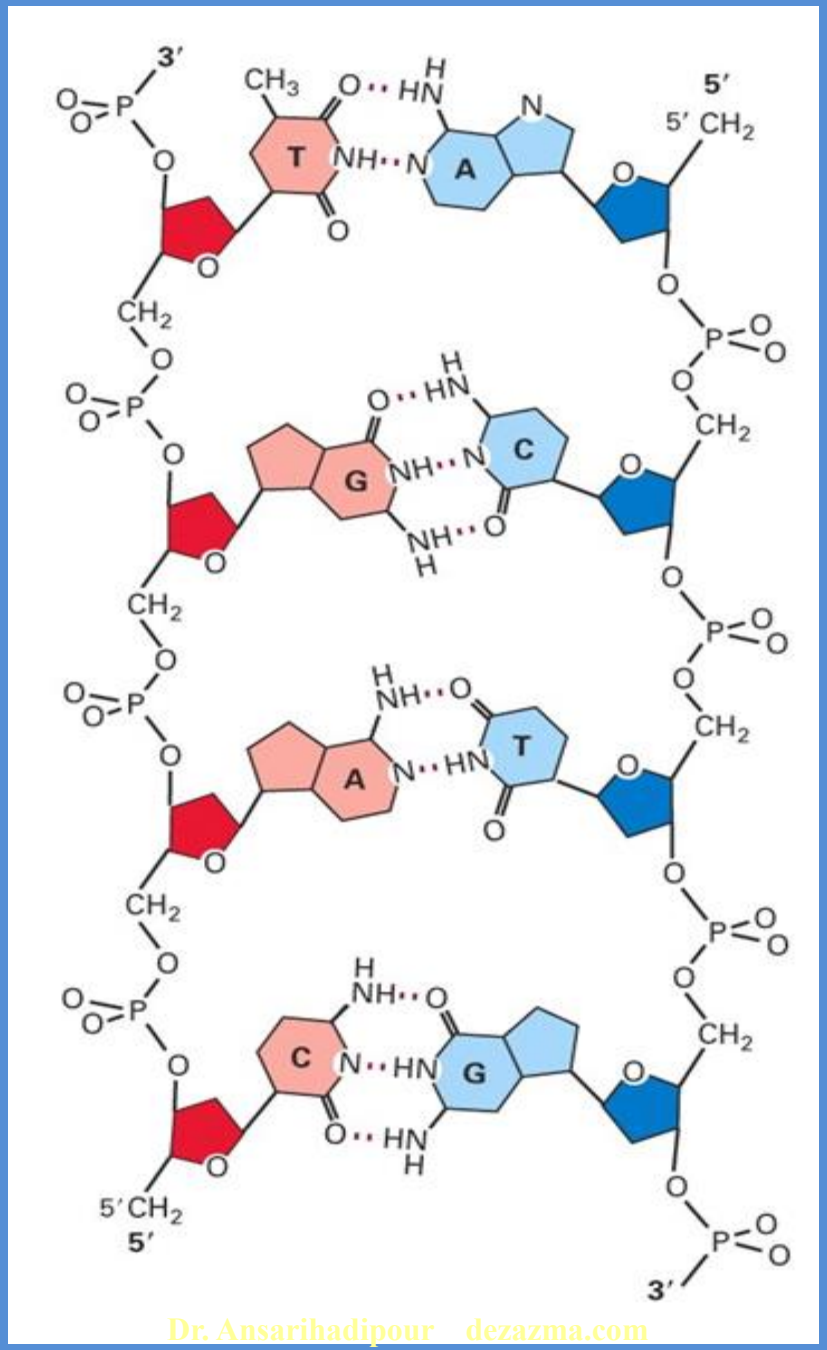

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DNA Repair

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DNA Repair

1. Breast Cancer
2. Hereditary Nonpolyposis Colon Cancer

CS: **Cockayne syndrome** or Neill-Dingwall syndrome

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Xeroderma Pigmentosum

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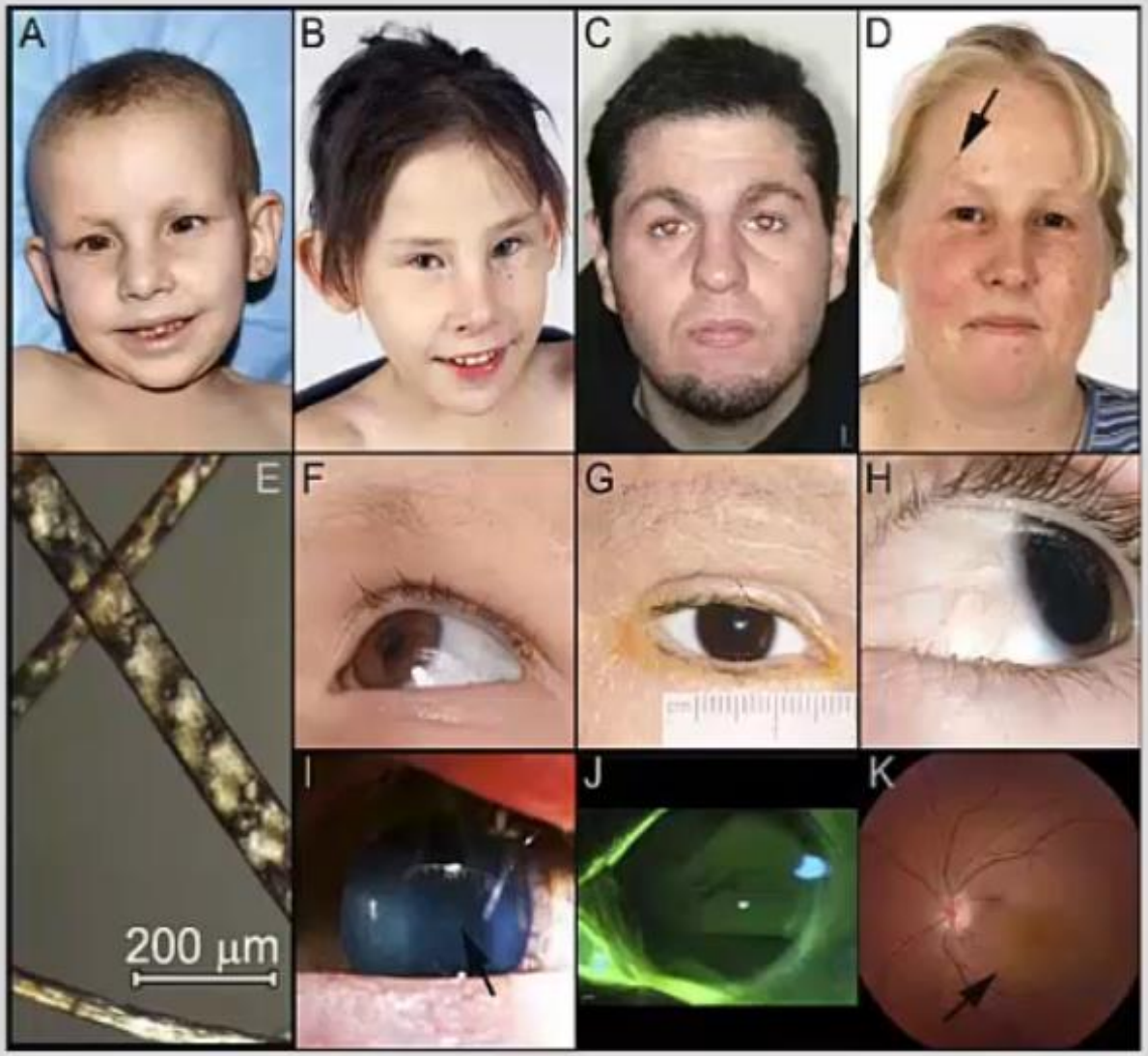

Trichothiodystrophy

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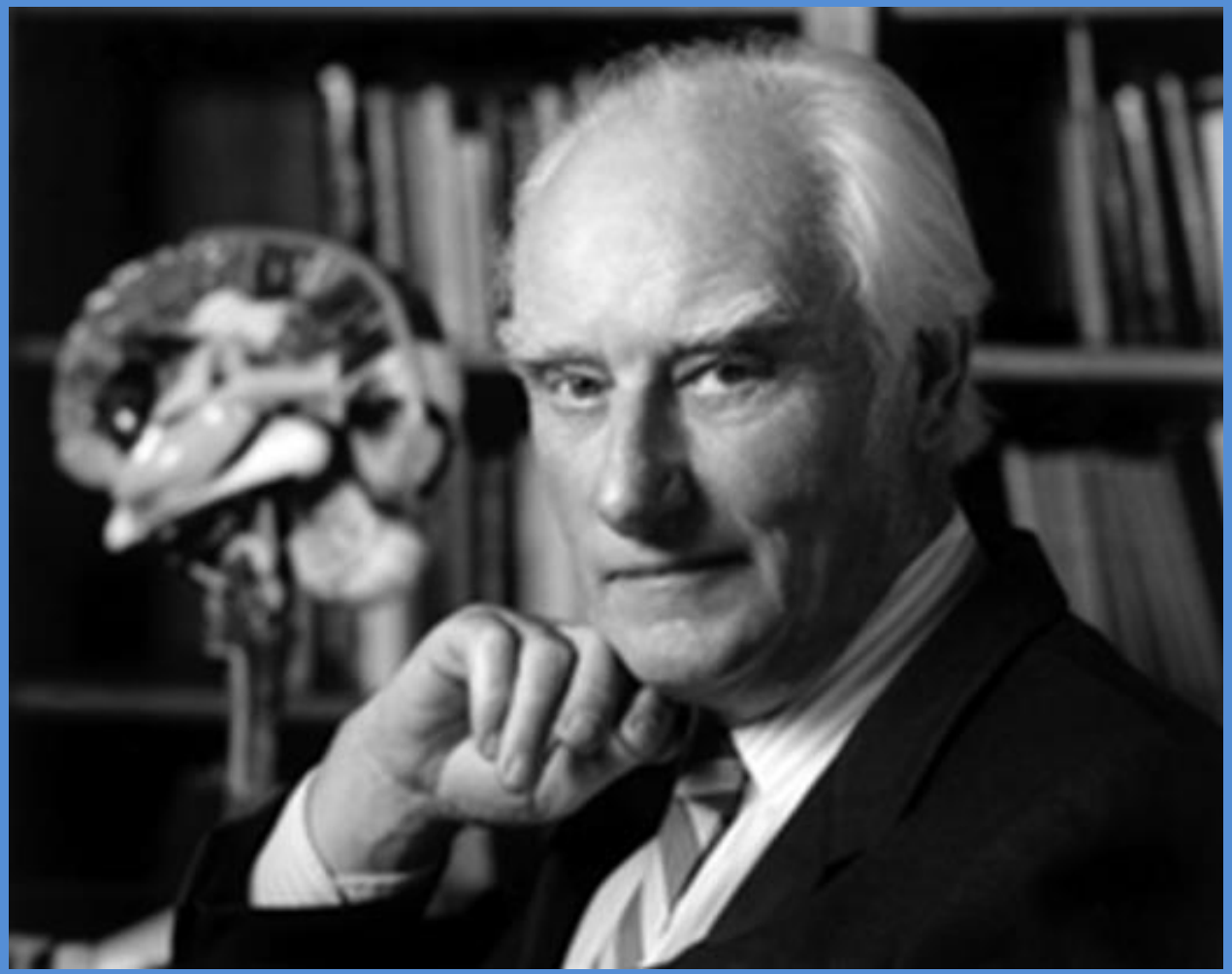
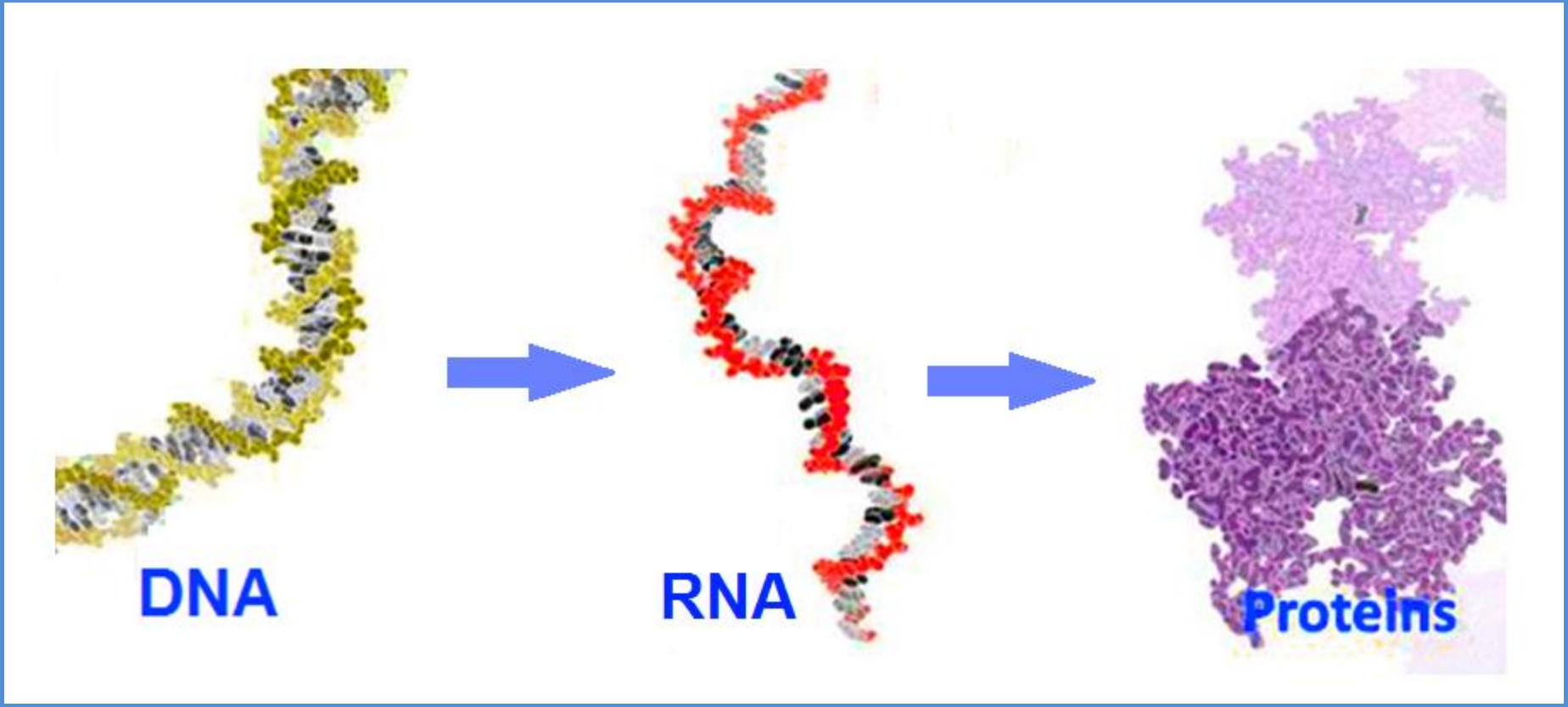
RNA

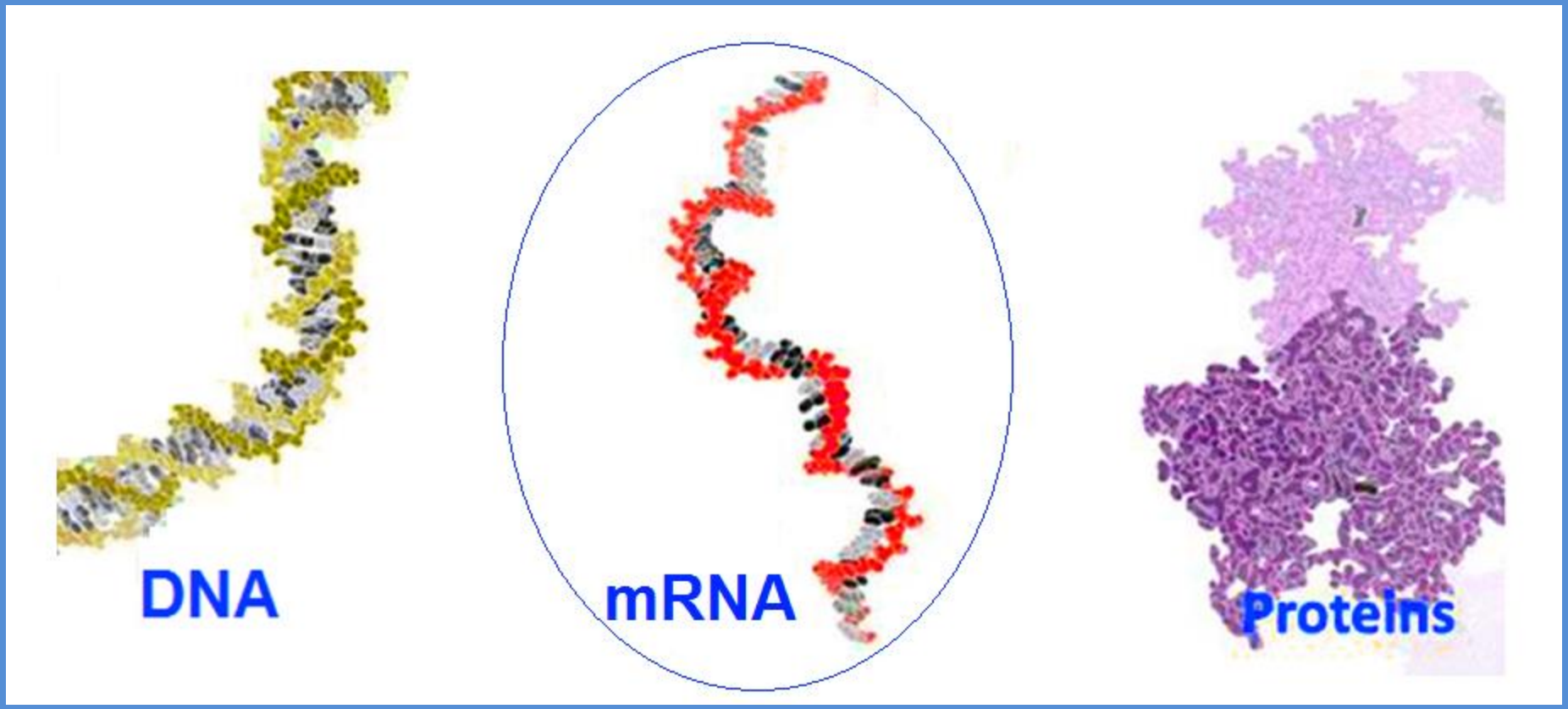
Ribonucleic Acid



Francis Harry Compton Crick



Cells use RNA for a number of different tasks, mainly gene expression.



One form of RNA is called messenger RNA or mRNA. mRNA transfers genetic information from genome into proteins by translation.

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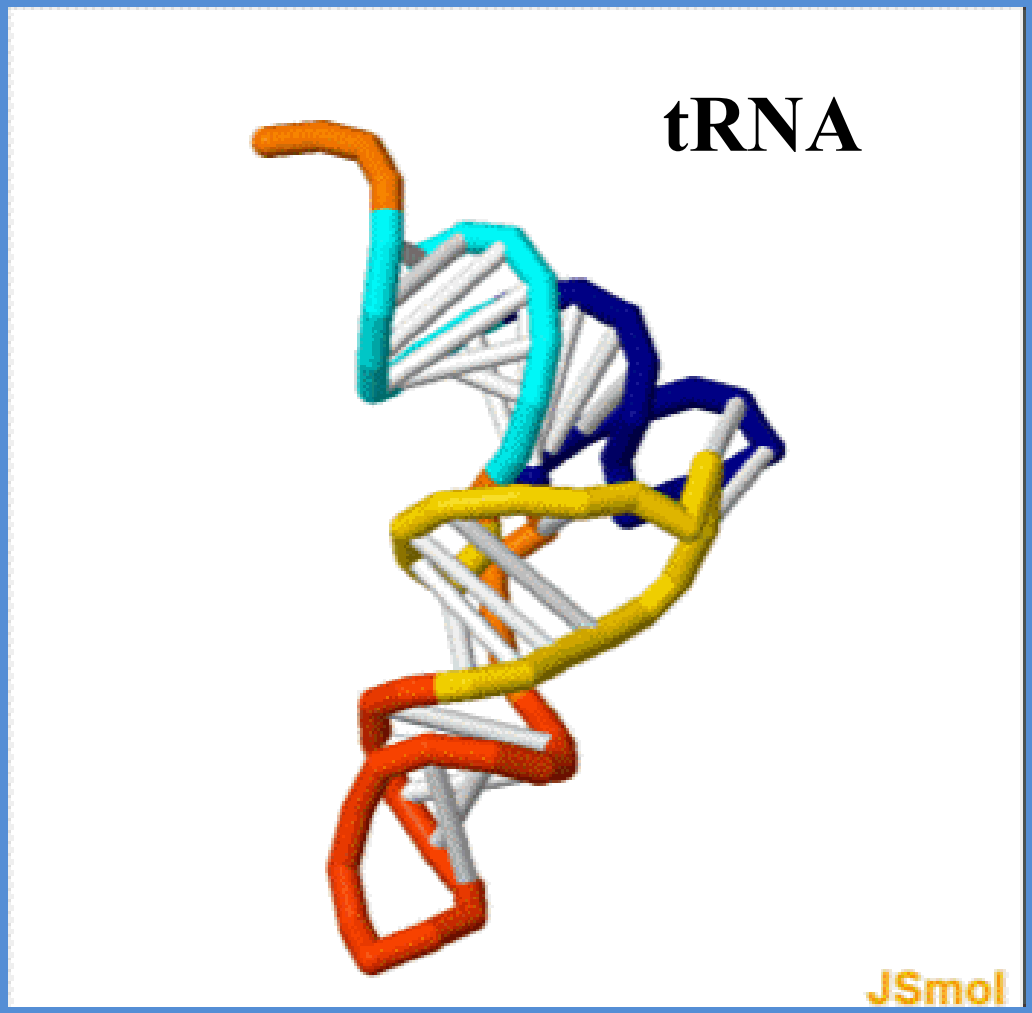
Robert William Holley

Marshall Warren Nirenberg

Har Gobind Khorana

For the first time, the structure of tRNA introduced by three independent research teams that were supervised by three scientists.



Another form of RNA is tRNA or transfer RNA

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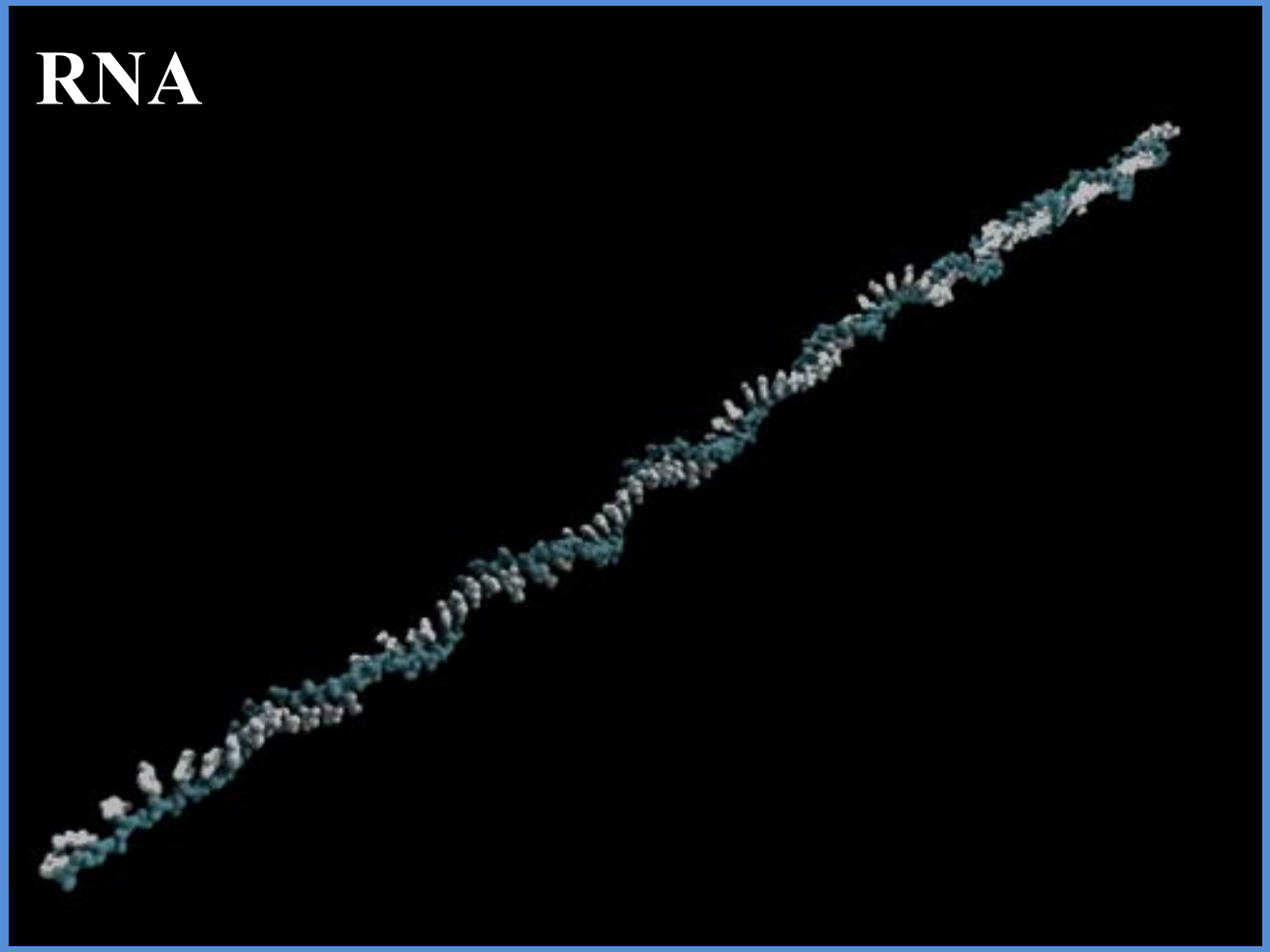
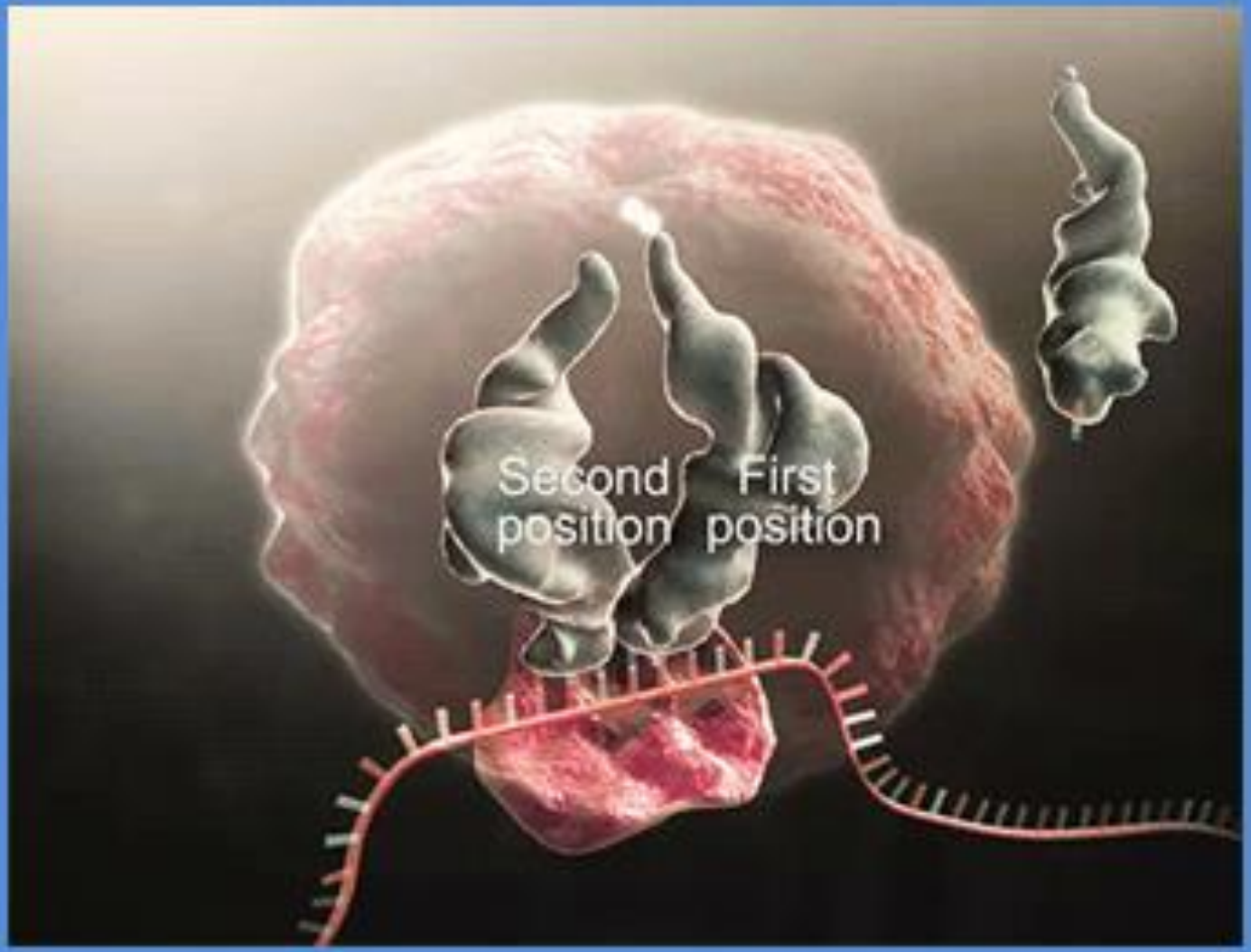
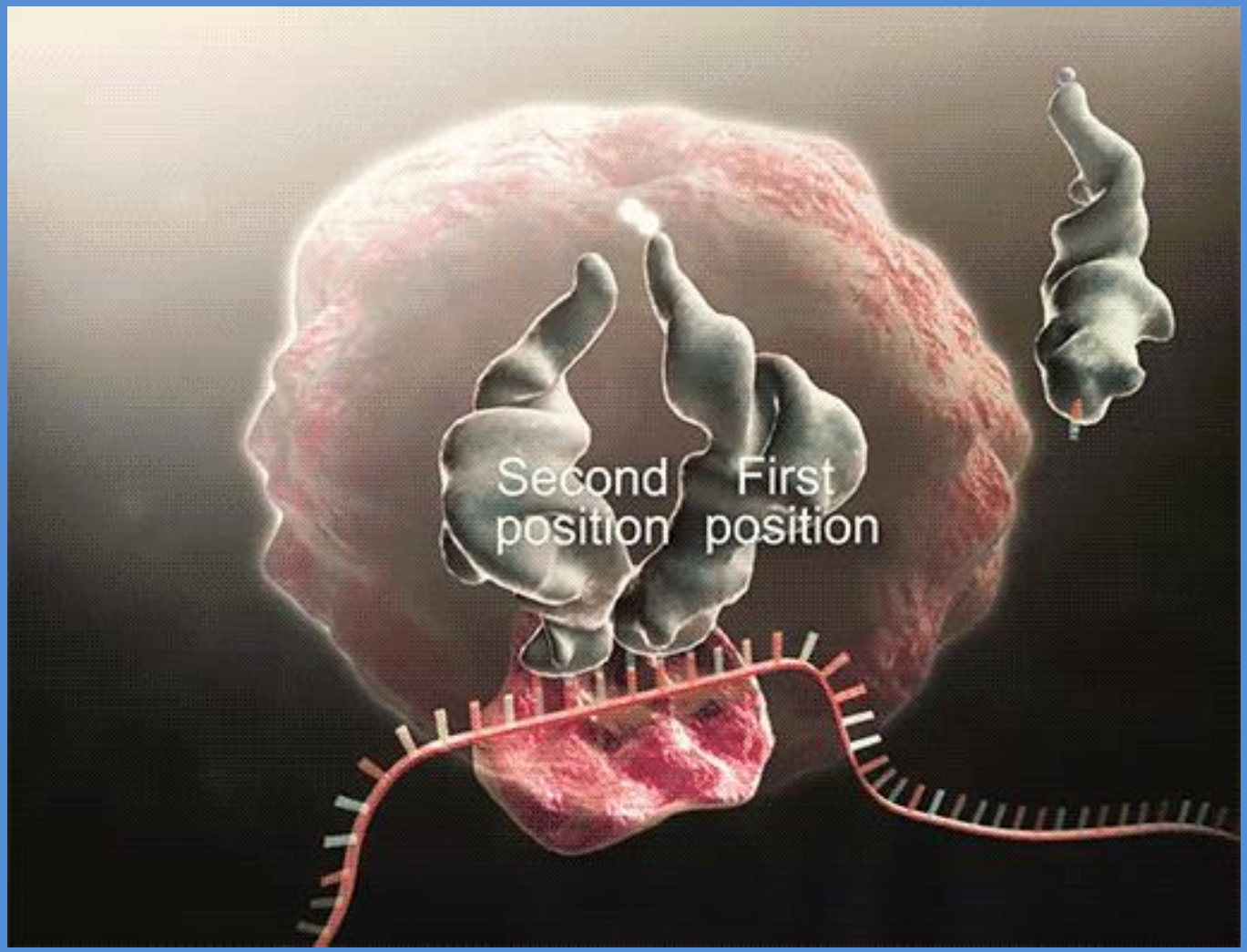


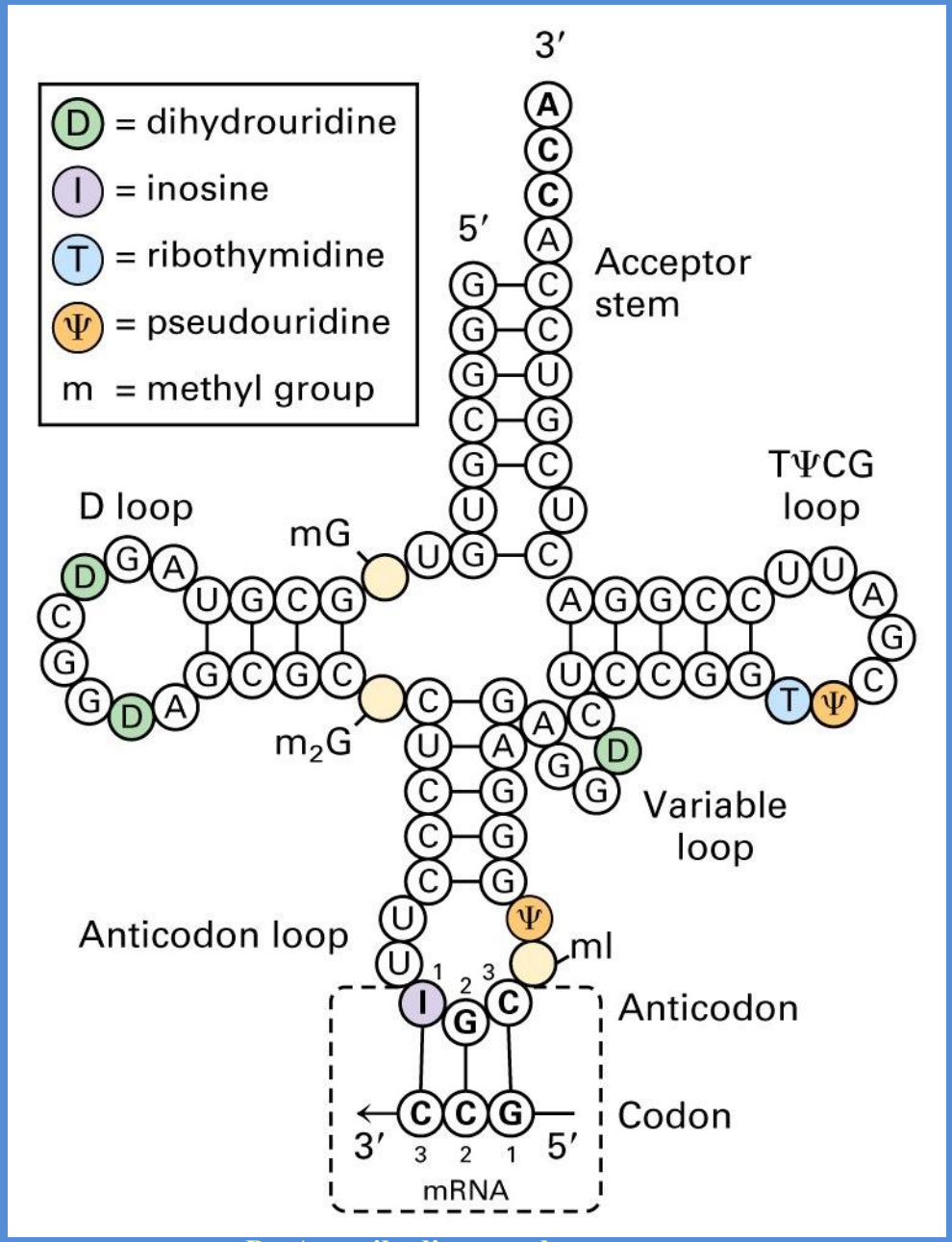
RNA is a single stranded polynucleotide.

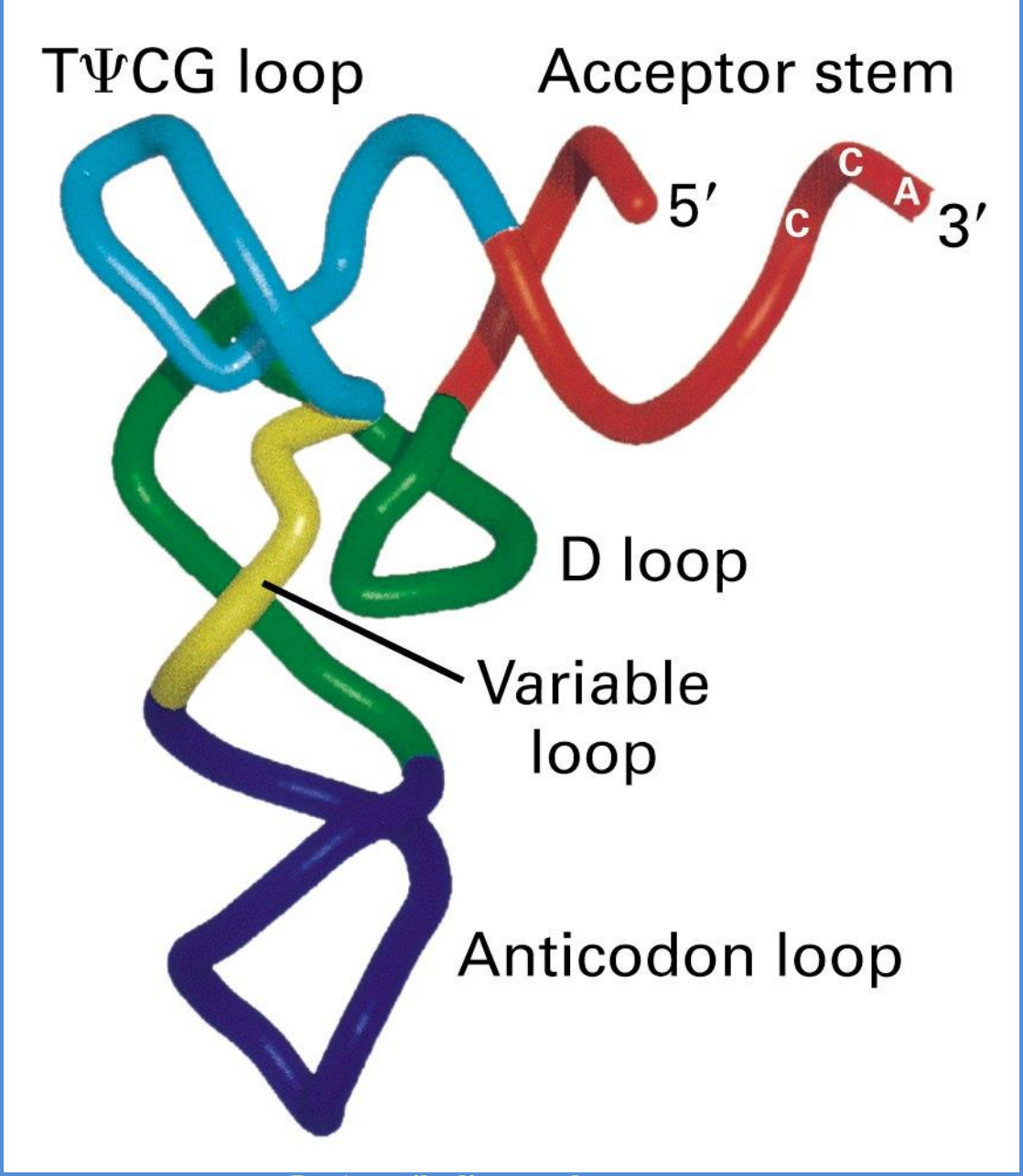


tRNA physically carry aminoacids to the translation site on ribosomes.

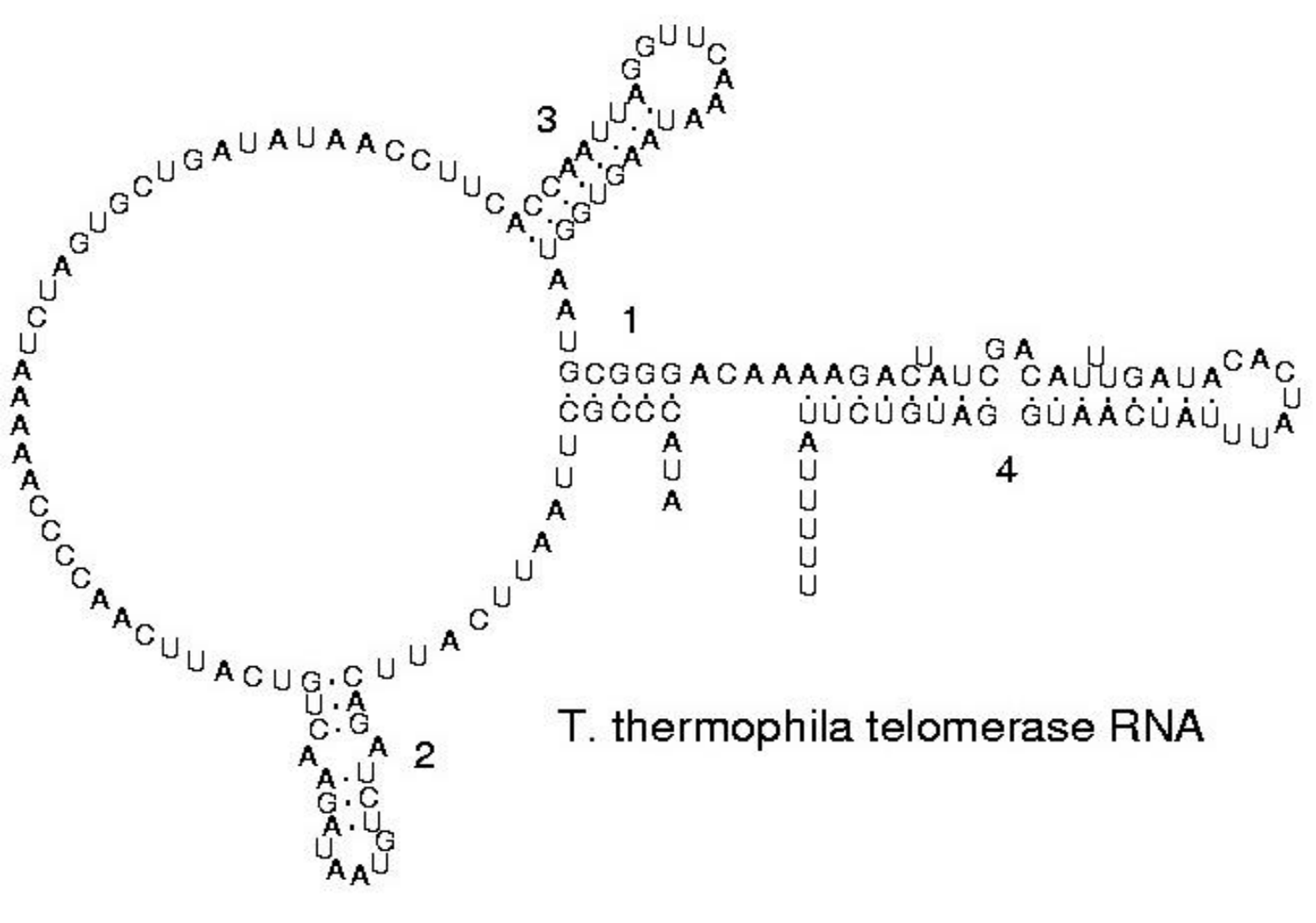


for protein synthesis during translation.

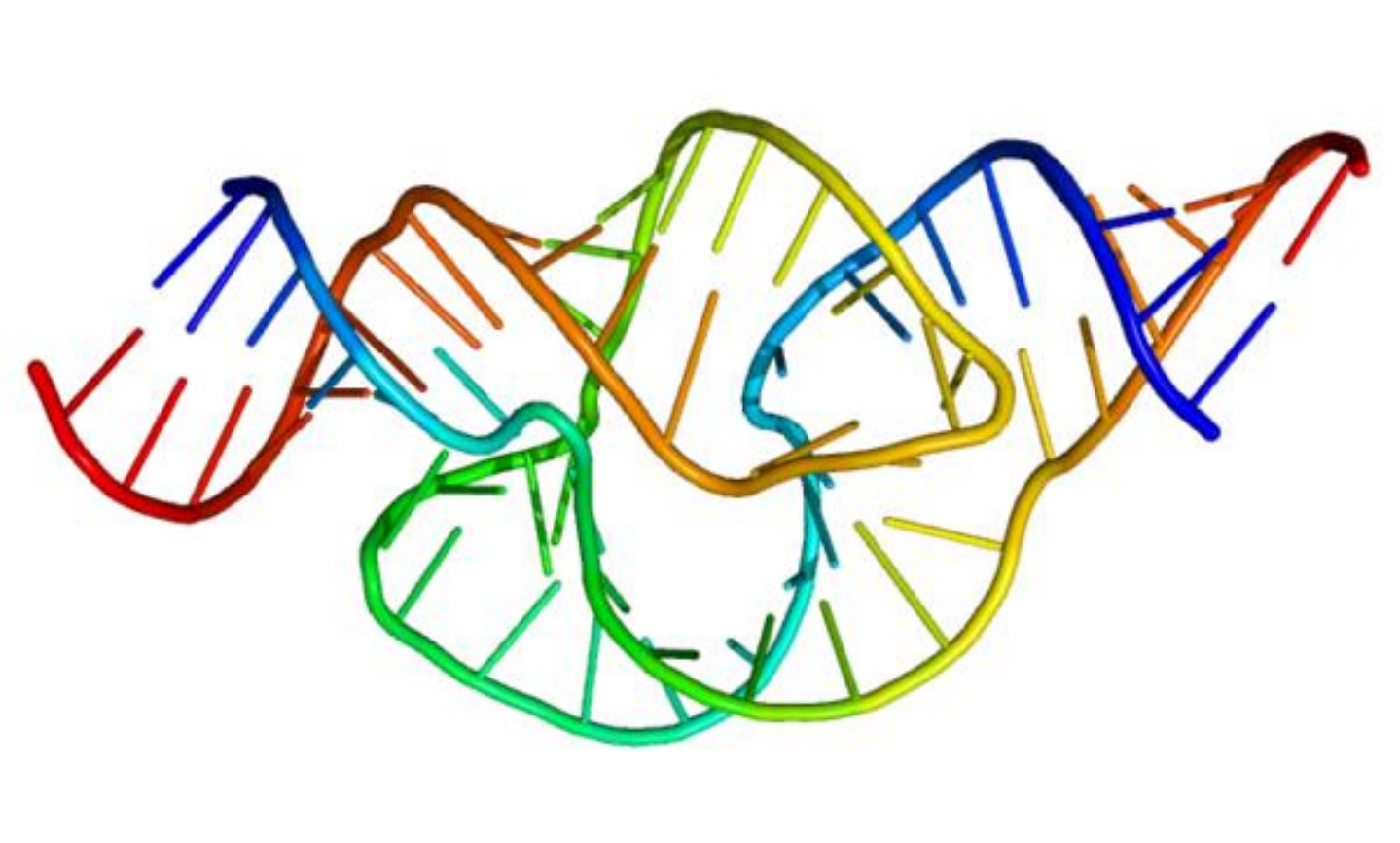

D = dihydrouridine
I = inosine
T = ribothymidine
Ψ = pseudouridine
m = methyl group
3′
5′
Acceptor stem
D loop
mG
TΨCG loop
m2G
Variable loop
Anticodon loop
ml
Anticodon
Codon
3′
5′
mRNA


TΨCG loop
Acceptor stem
5′
C
C
A
3′
D loop
Variable loop
Anticodon loop

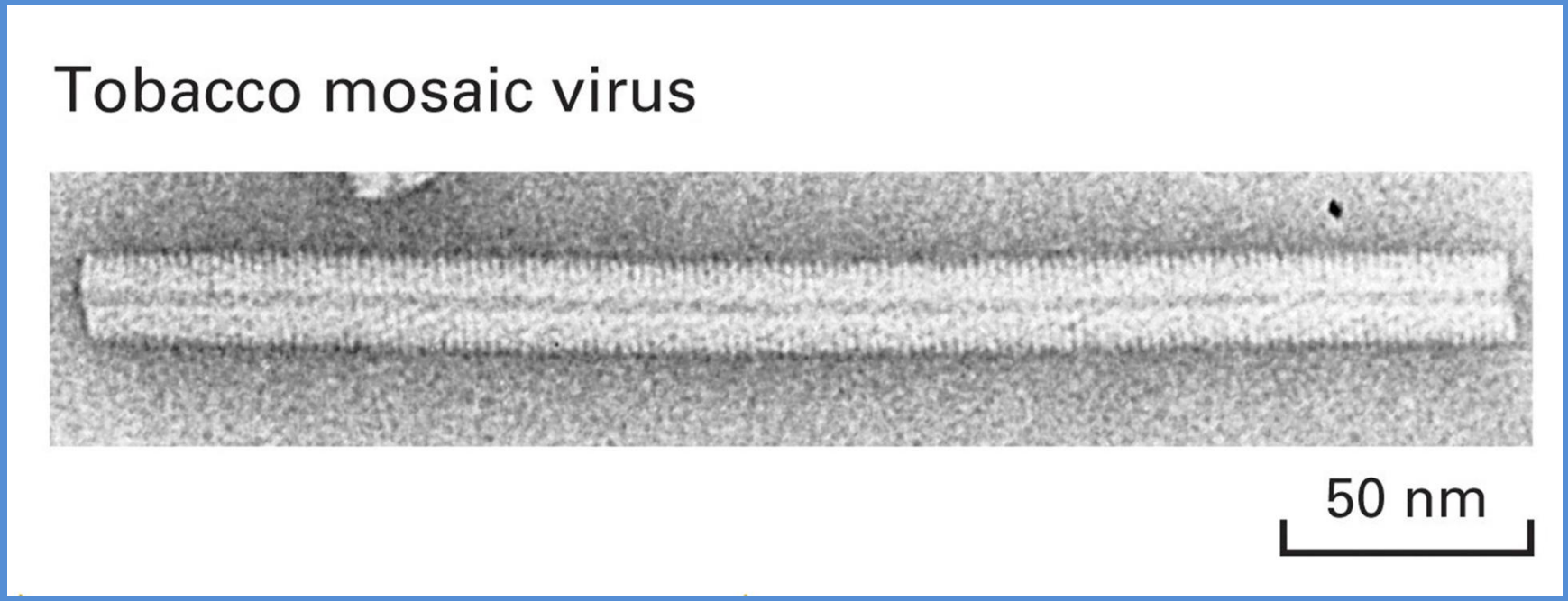
Model of the complete (70S) ribosome of *E. coli*



Secondary structure of a telomerase RNA.



Hammerhead ribozyme is an RNA molecule that self-cleaves via a small conserved secondary structural motif termed a hammerhead because of its shape



RNAs can also be the viruses' genetic blueprints. For example, tobacco mosaic virus (TMV) contains a positive-sense single stranded RNA.

Tobacco mosaic virus infects plants, especially tobacco.

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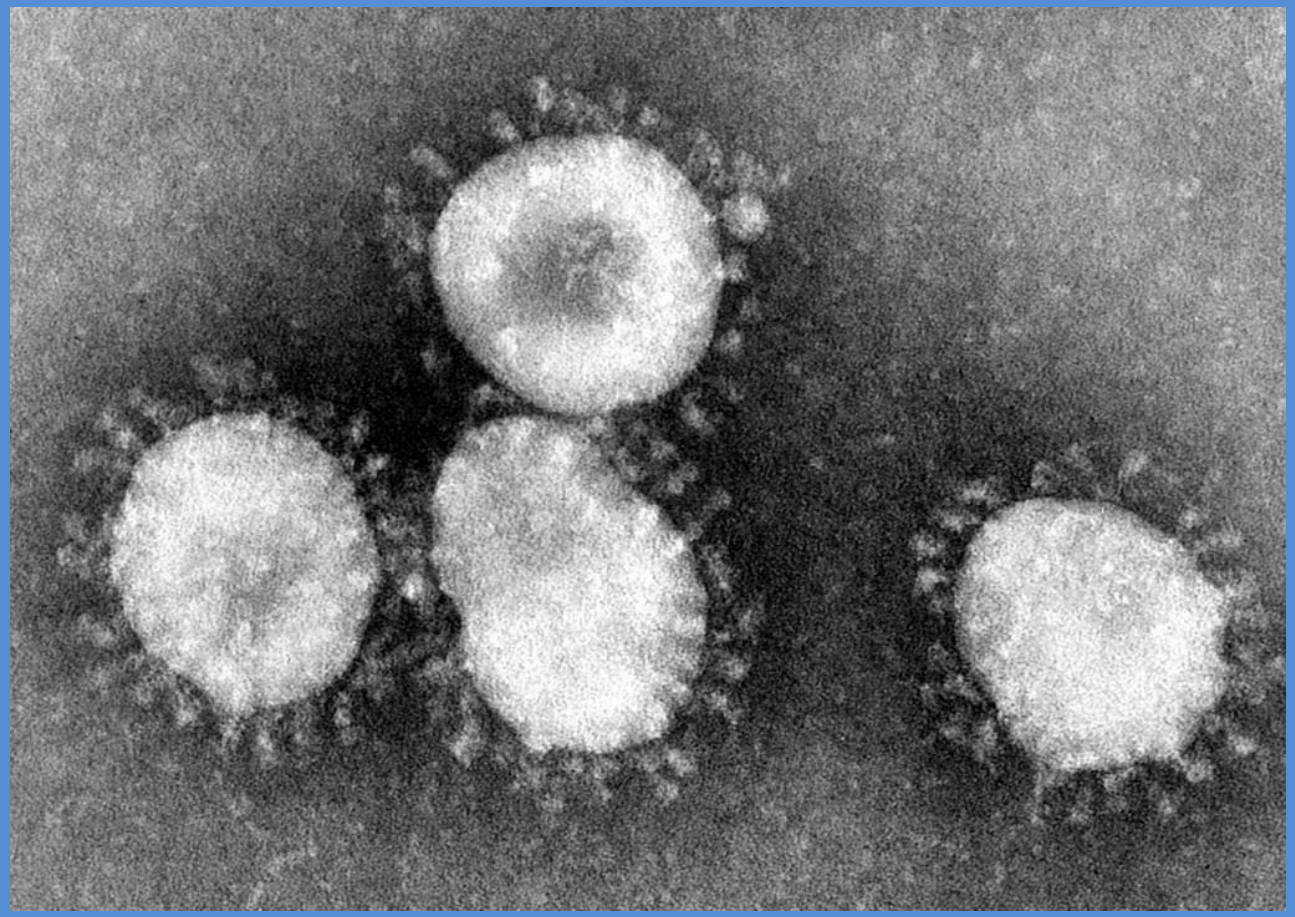
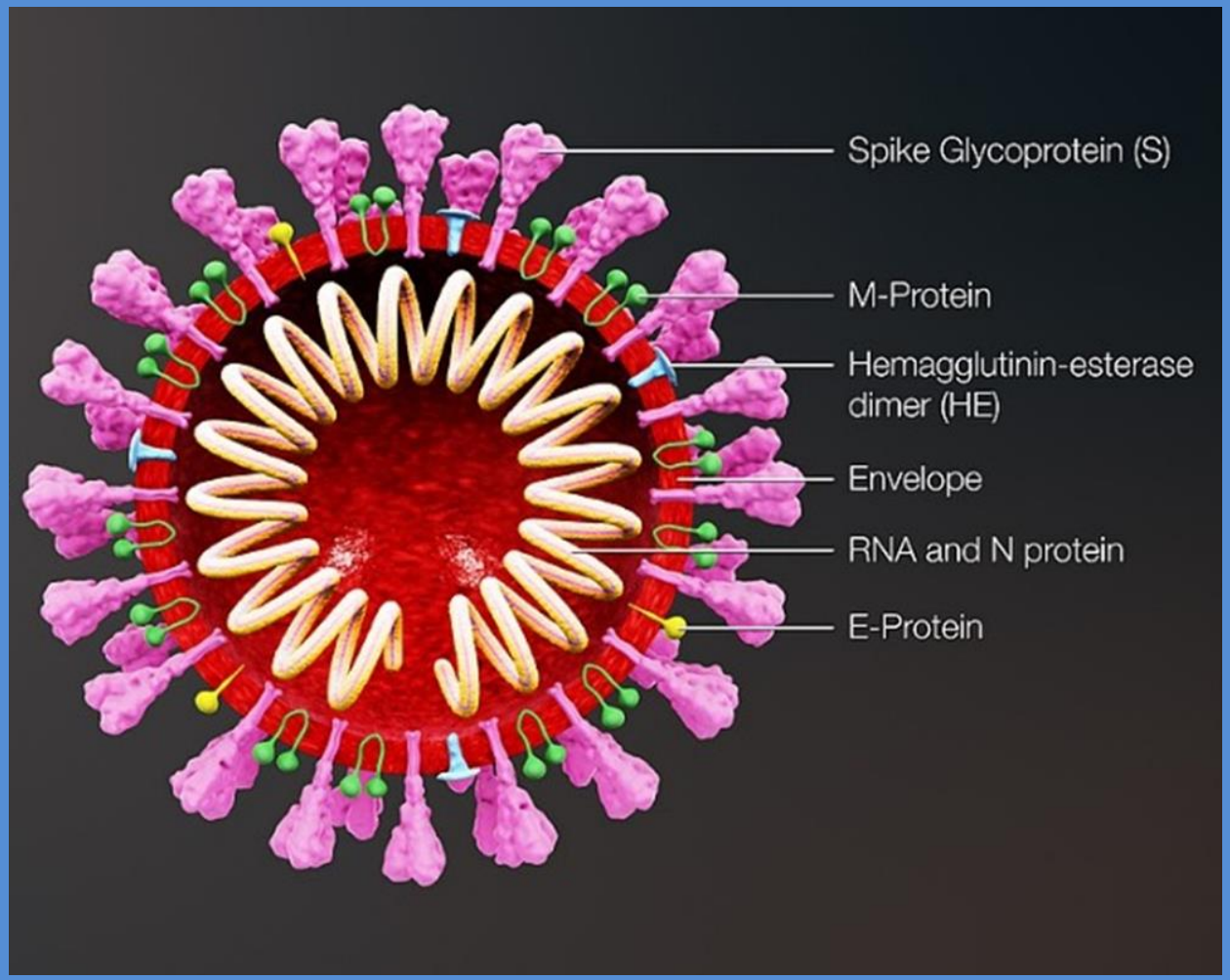
and other members of the Solanaceae family.



Moreover, RNA is the genetic material for coronaviruses.



The virus envelop consists of a lipid bilayer.

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