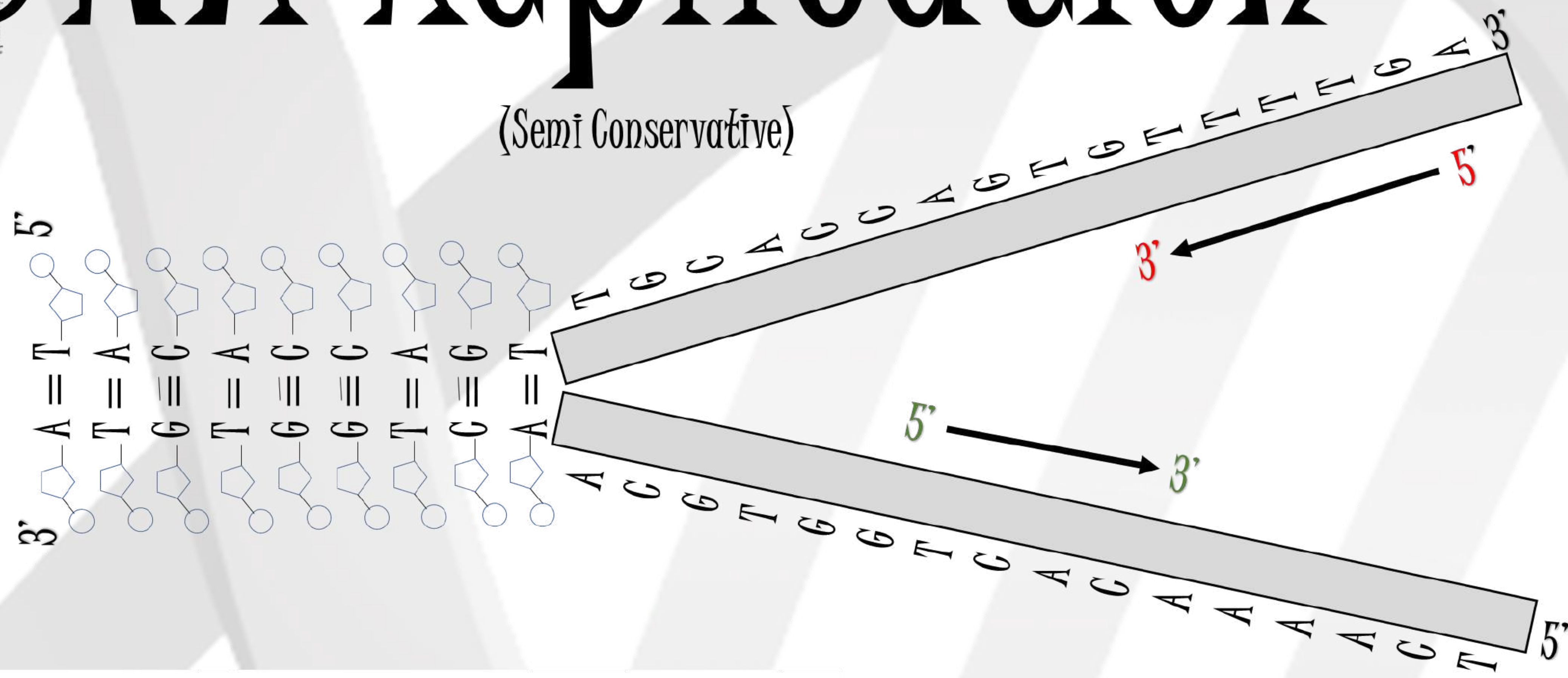
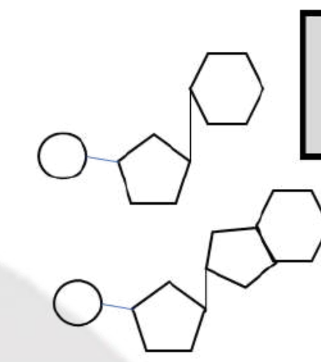
DNA Replication

(Semi Conservative)



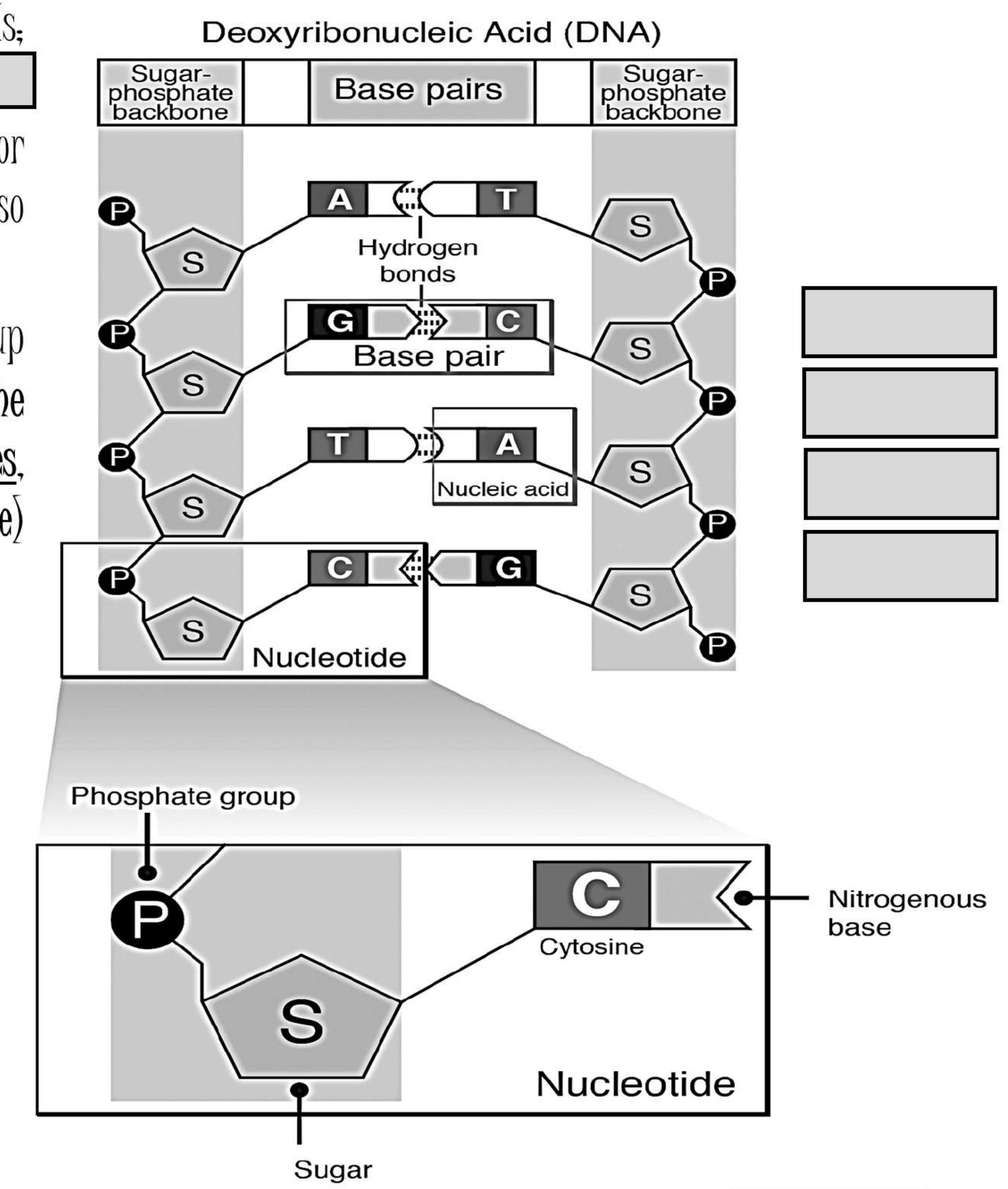


______ ______

______

______ are the building blocks (*monomers*) of nucleic acids; they are composed of three sub unit molecules: a ______ (also known as nucleobase), a ______ (ribose or deoxyribose), and a ______ group. Nucleotides also play a central role in metabolism at a fundamental, cellular level.

<u>Purines</u> and <u>Pyrimidines</u> are nitrogenous bases that make up the two different kinds of nucleotide bases in DNA and RNA. **The two-carbon nitrogen ring** bases (**adenine** and **guanine**) are <u>purines</u>, while the **one-carbon nitrogen ring bases** (**thymine** and **cytosine**) are <u>pyrimidines</u>.



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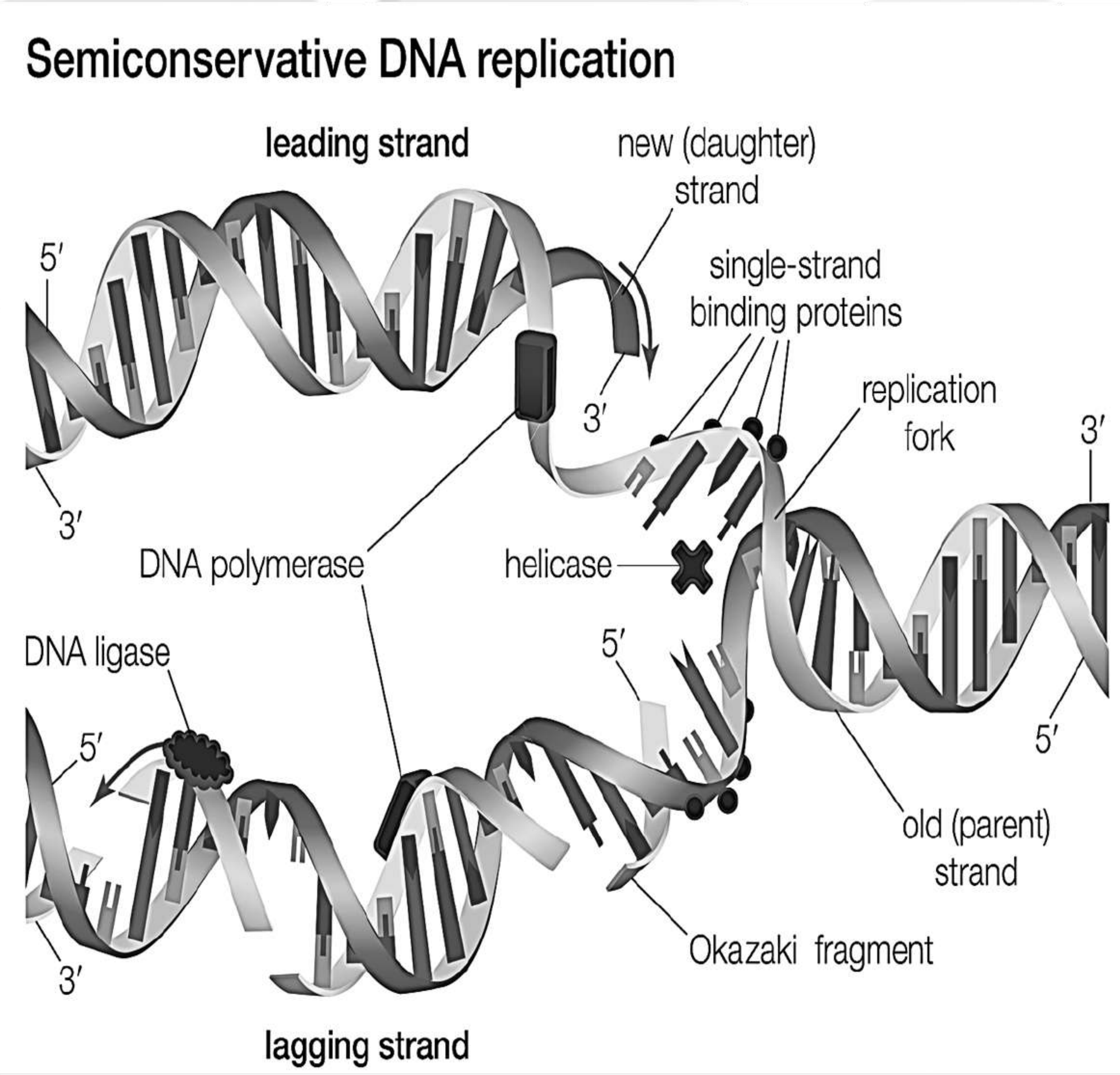
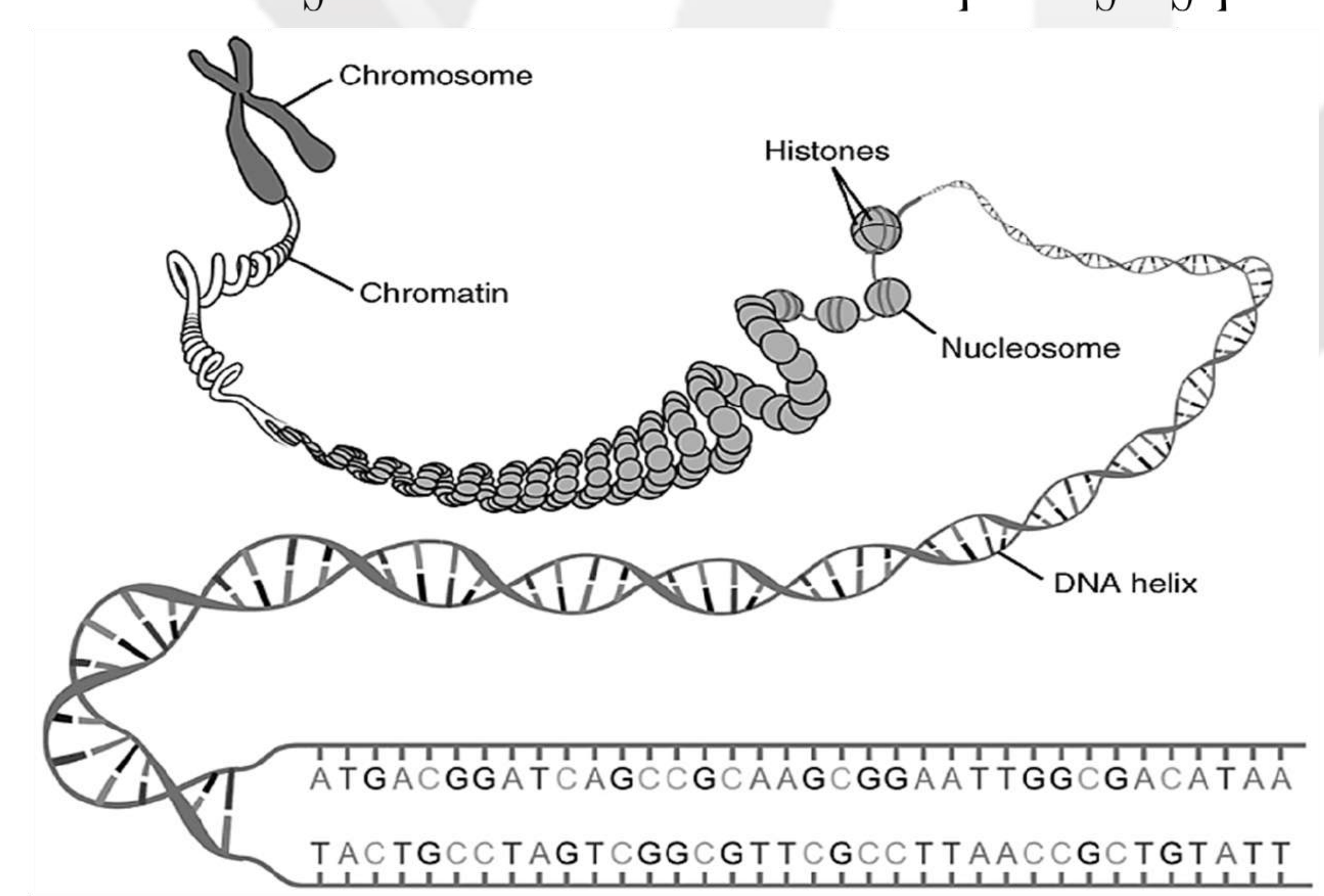


______ describes the mechanism of DNA replication in all known cells. It derives its name from the fact that it produces two copies of the original DNA molecule, each of which contains one of original strand, and one newly-synthesized strand.

Steps: Occurs in ______

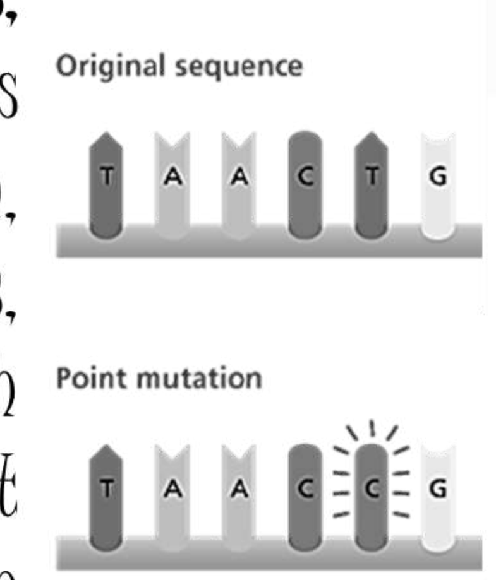
1. The enzyme **DNA helicase** breaks the hydrogen bonds between the two polynucleotide DNA strands causing the double helix to unzip, forming two single strands.
2. Each original single strand then acts as a template for a new strand. Free-floating DNA nucleotides join to the exposed bases on each original template strand via complementary base pairing.
3. The nucleotides of the new strands are joined together by the enzyme **DNA polymerase**. This forms the sugar-phosphate backbone. Hydrogen bonds form between the bases on the original and new strand and the strands twist to reform the double helix.
4. Each new DNA molecule contains one strand from the original DNA molecule and one new strand, hence the term semi-conservative replication.

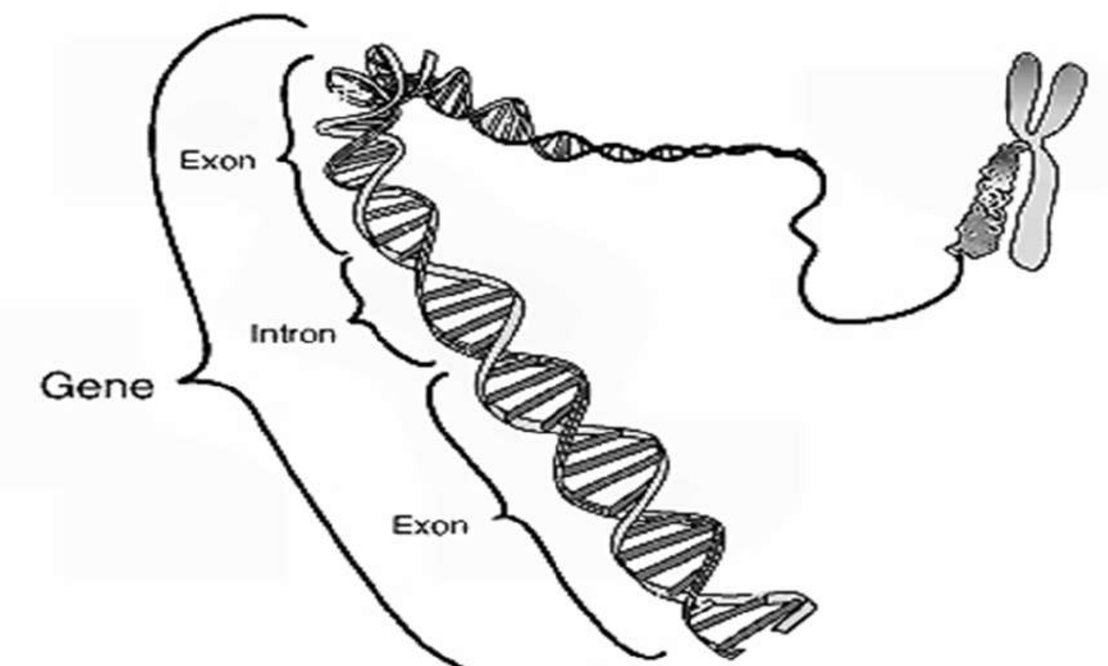
This DNA-protein complex is called ______, wherein the mass of protein and nucleic acid is nearly equal. Within cells, chromatin usually folds into characteristic formations called ______ Each **chromosome** contains a single double-stranded piece of DNA along with the aforementioned packaging proteins.



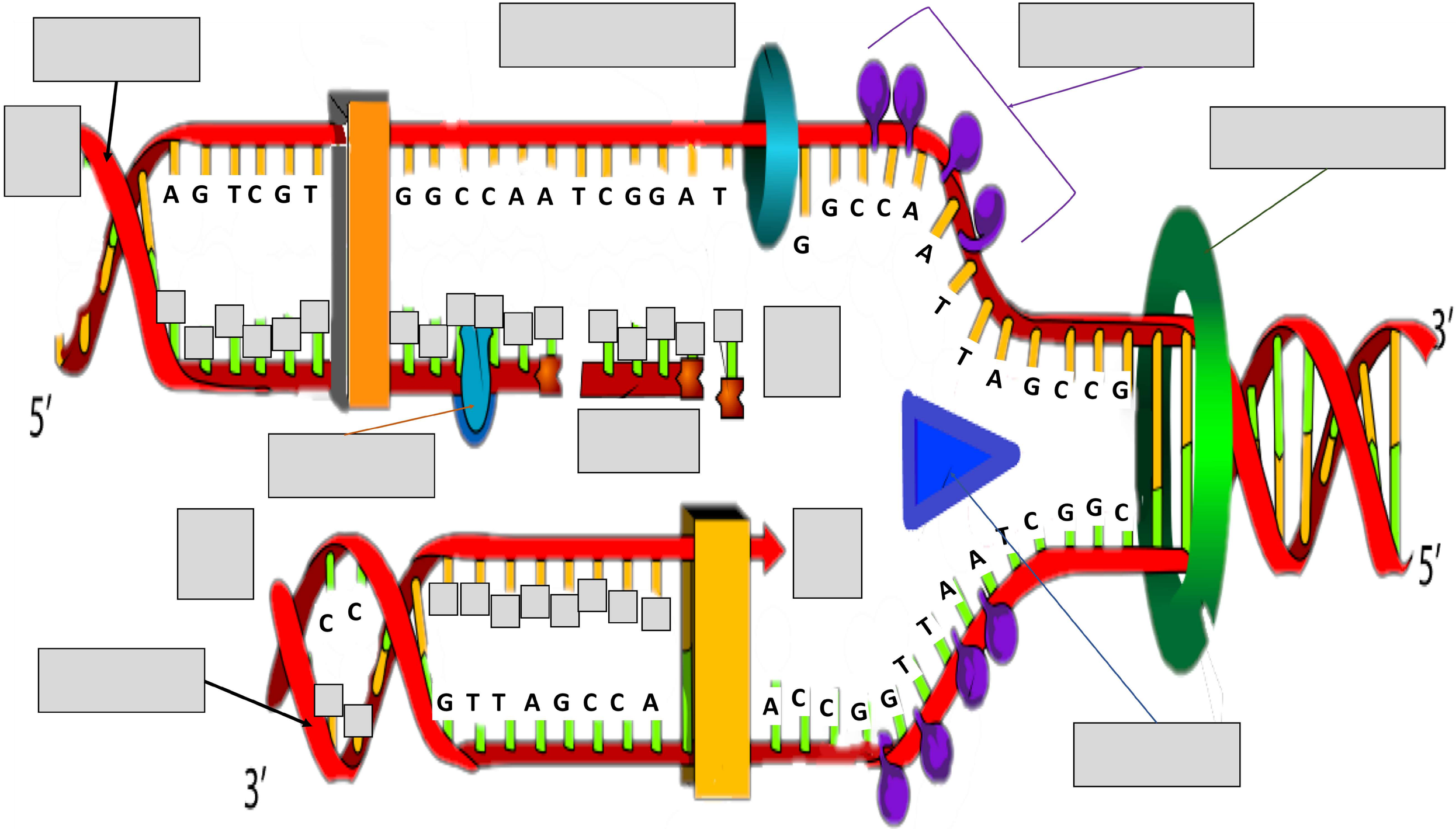
______

What would happen if just one of those nitrogenous bases (Adenine, Thymine, Guanine, and Cytosine) were no longer in the correct order? **A mutation is a permanent change of a nitrogen base, or multiple nitrogen bases, that make up a gene.** Mutations affect the translation of the codons because the order of the nucleotides has been changed. Depending on how a mutation is translated, it can result in no change in the resulting protein, an insignificant change, or one that may be crucial for life. Mutations can occur via environmental changes, such as UV rays or radiation, or from fault in gene replication. There are different types of mutations, each resulting in a different product. Most mutations are insignificant or neutral. However, some mutations result in **gene alteration**, meaning the mutation resulted in a complete change of the gene. Another type of mutation is complete gene rearrangement. The order of the gene expression is important. Therefore, whenever **an entire gene is moved to a new location**, as what happens **during gene rearrangement**, there is a change in gene expression.





A ______ is the fundamental, physical, and functional unit of heredity. It is because a **gene is comprised of nucleotides** (on a specific site on a chromosome) that is **responsible** for the **physical** and **heritable characteristics** or phenotype of an **organism**


A G TC G T
G G C C A A T C GG A T
G C C A
G
A
T
T
A G C C G
5′
3′
C C
G T T A G C C A
A C C G G T T A A T C G G C
3′
5′

3’

T C A C G T A C T

A G C C G T G C

5’

G G A C G

C A T G T

Binding Proteins

5’

Ligase

DNA Polymerase

3’

Helicase

Lagging Strand

Topoisomerase

Okazaki Fragment

Leading Strand

DNA Replication

Semiconservative Replication

Nucleotides

Pyrimidine

Purine

A - Adenine

T - Thymine

G - Guanine

C - Cytosine

Nitrogenous Base

Five carbon sugar

Least 1 phosphate

Chromatin

Chromosome

S-Phase of INTERPHASE

A C G T G G T C A C A A A A C T

Gene

T G C A C C A G T G T T T T G A

Mutations