

The Components and Structure of DNA

- **nucleotides**

- monomer of nucleic acids

- made up of:

- a five-carbon sugar called deoxyribose

- a phosphate group

- a nitrogenous base.

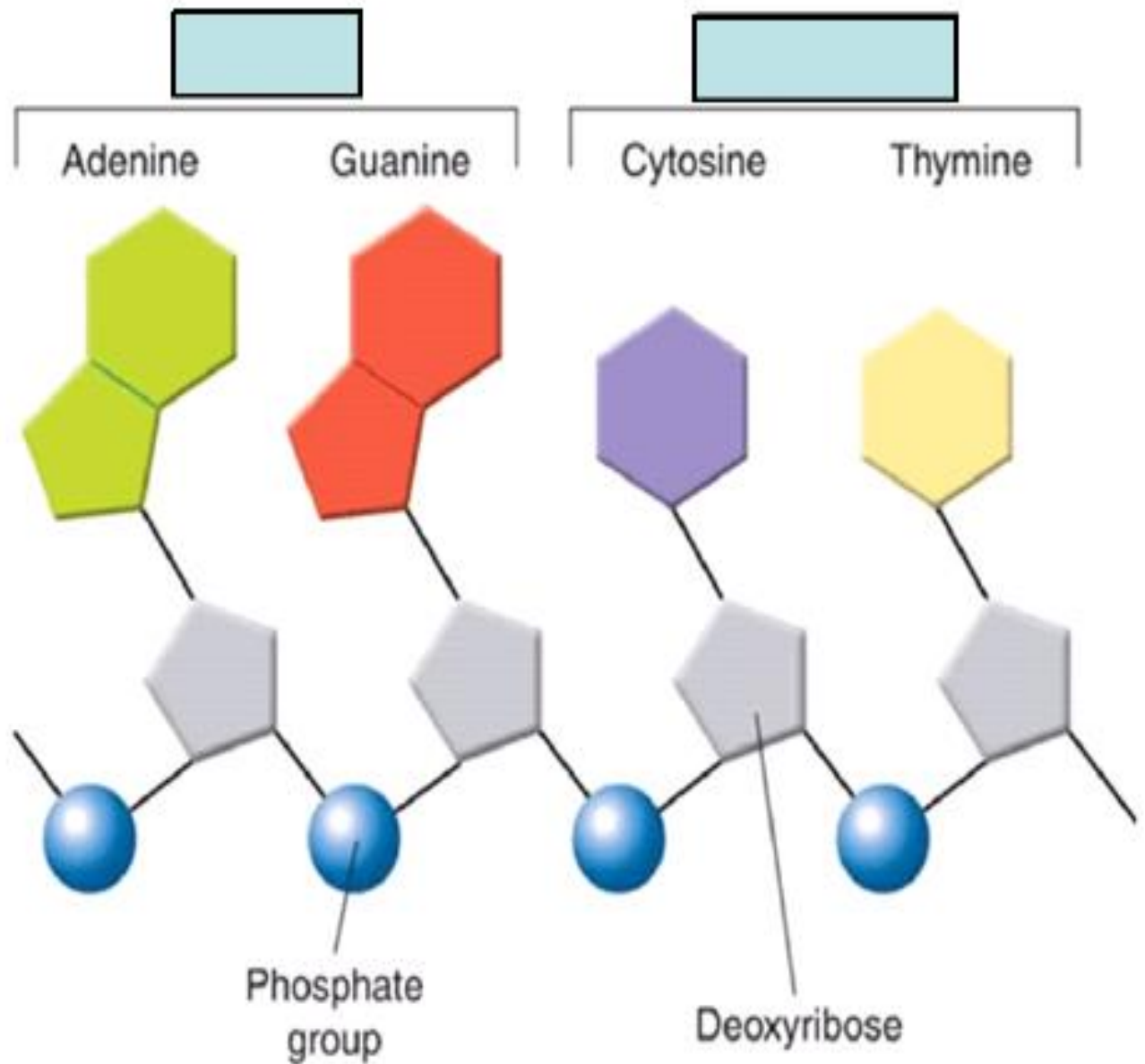
- The backbone of a DNA chain formed by sugar and phosphate groups

- can be joined together in any order

The Components and Structure of DNA

•four bases in DNA:

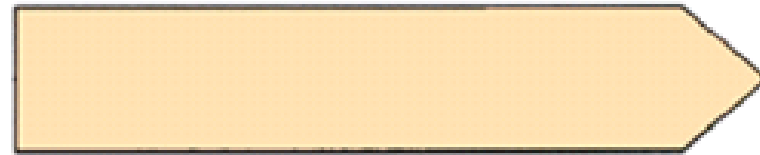
- adenine
- guanine
- cytosine
- thymine



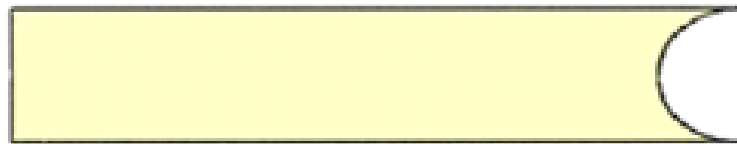
The Bases in DNA



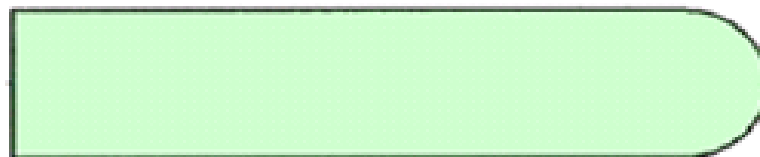
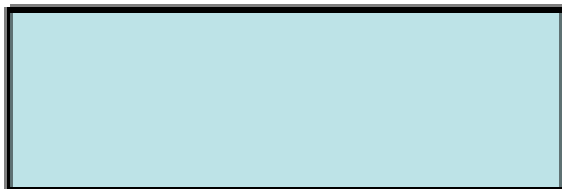
(A)



(T)



(C)



(G)

The Components and Structure of DNA

- Chargaff's Rules

- % guanine [G] and % cytosine [C] bases are almost equal in any sample of DNA

- % adenine [A] and % thymine [T] bases are almost equal in any sample of DNA

Complimentary Bases

- The four bases can only combine in specific ways (base-pairing).

- Adenine can only bond with



- Guanine can only bond with



Helpful Mnemonic

- The way the bases bond in DNA is sometimes remembered with the mnemonic...



(A – T and G – C)

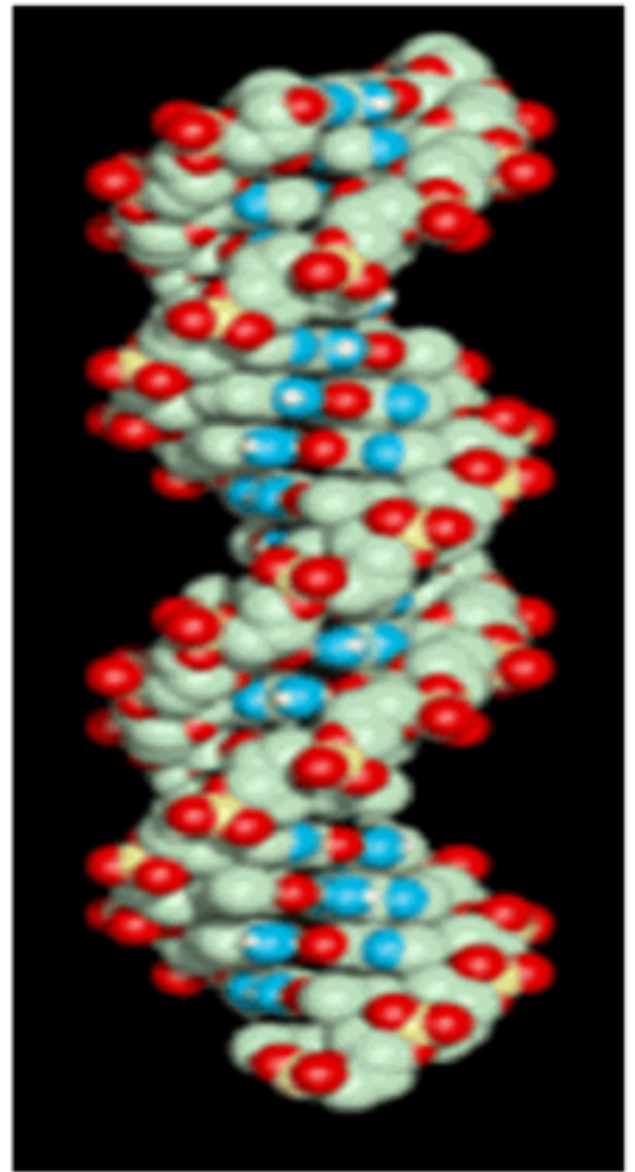
- In RNA, the sentence is changed to...



(A – U and G – C)

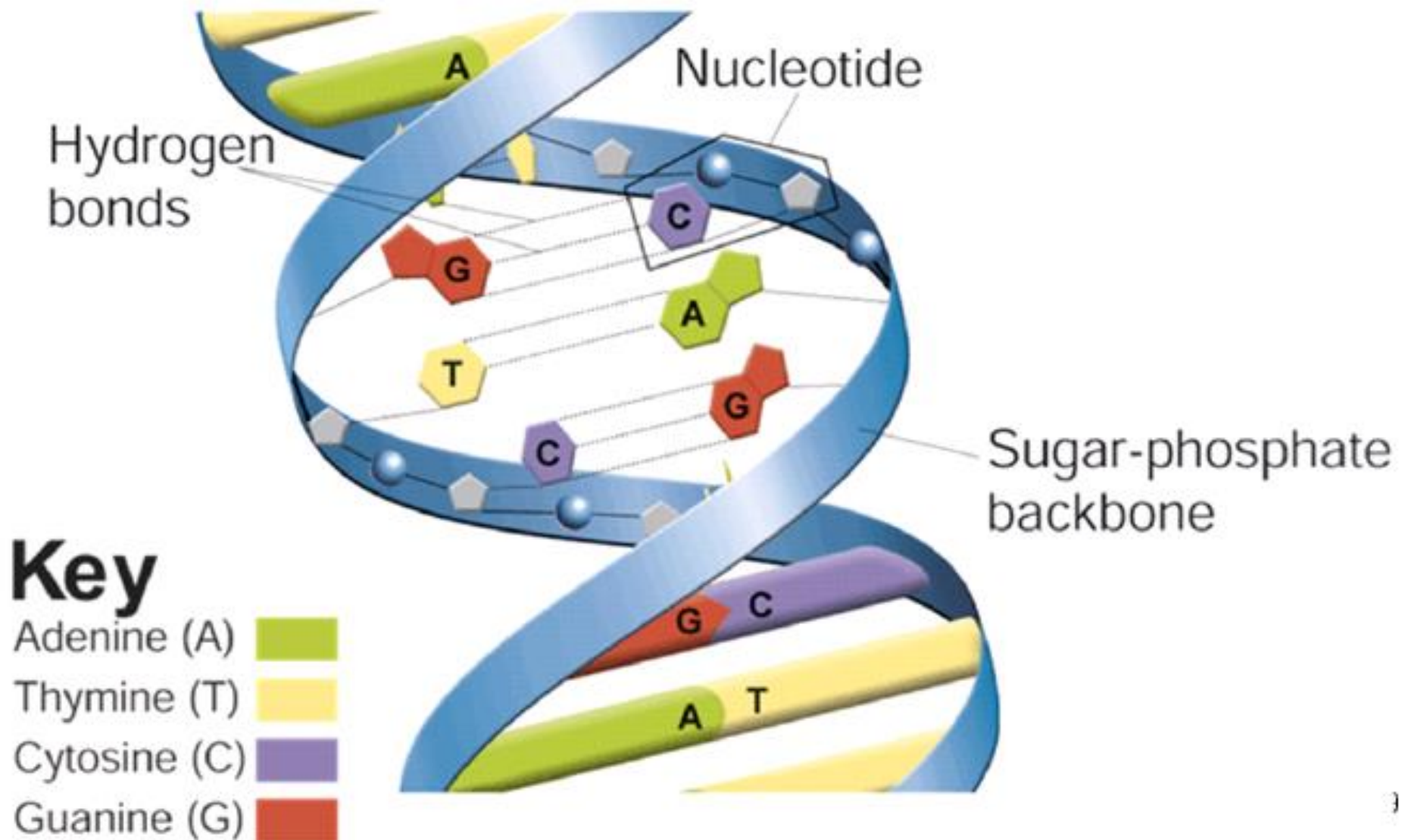
The Shape of the Molecule

- Two strands of DNA twist around each other to form a
- like a twisted ladder or zipper
- Held together by hydrogen bonds

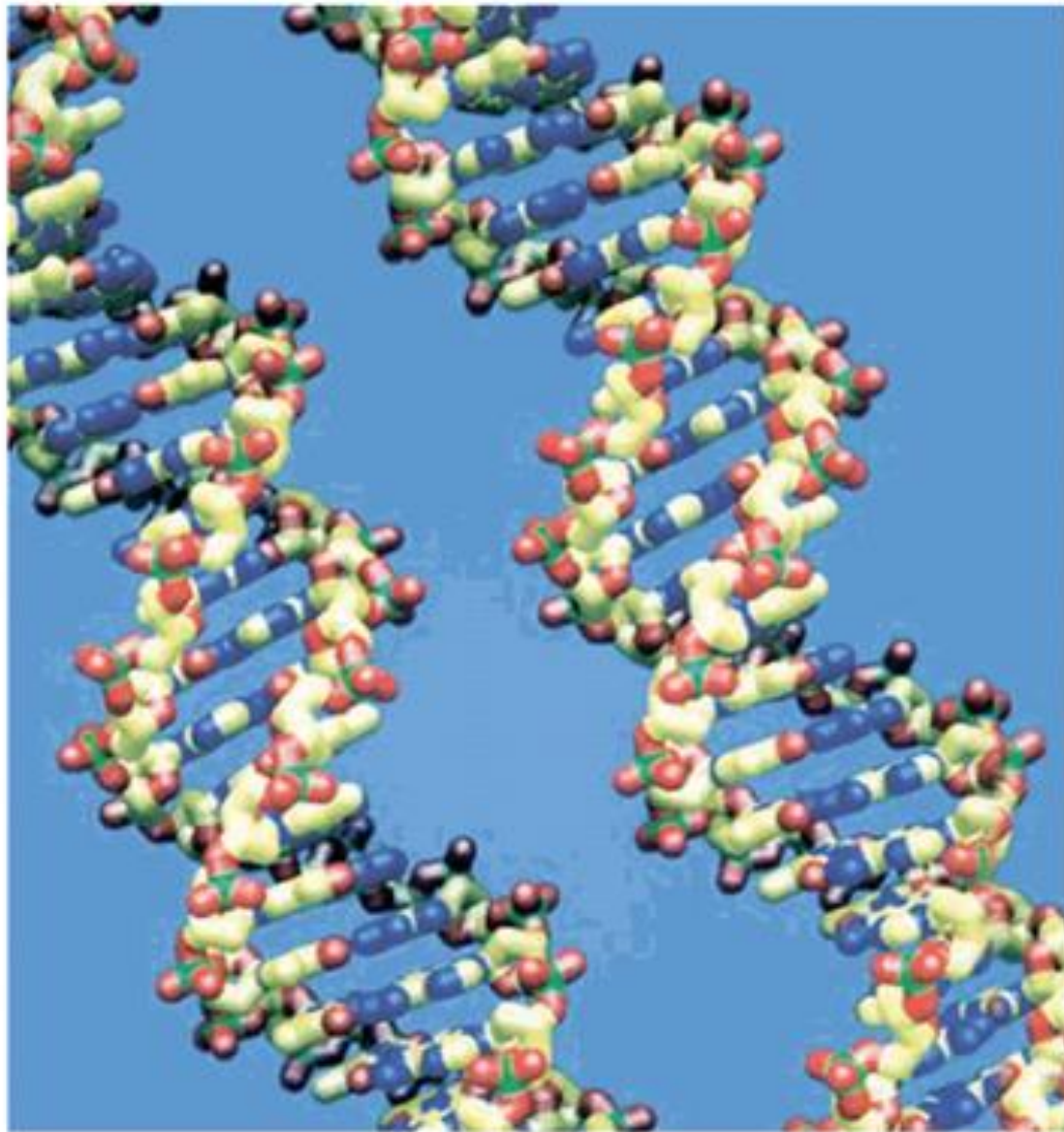


The Components and Structure of DNA

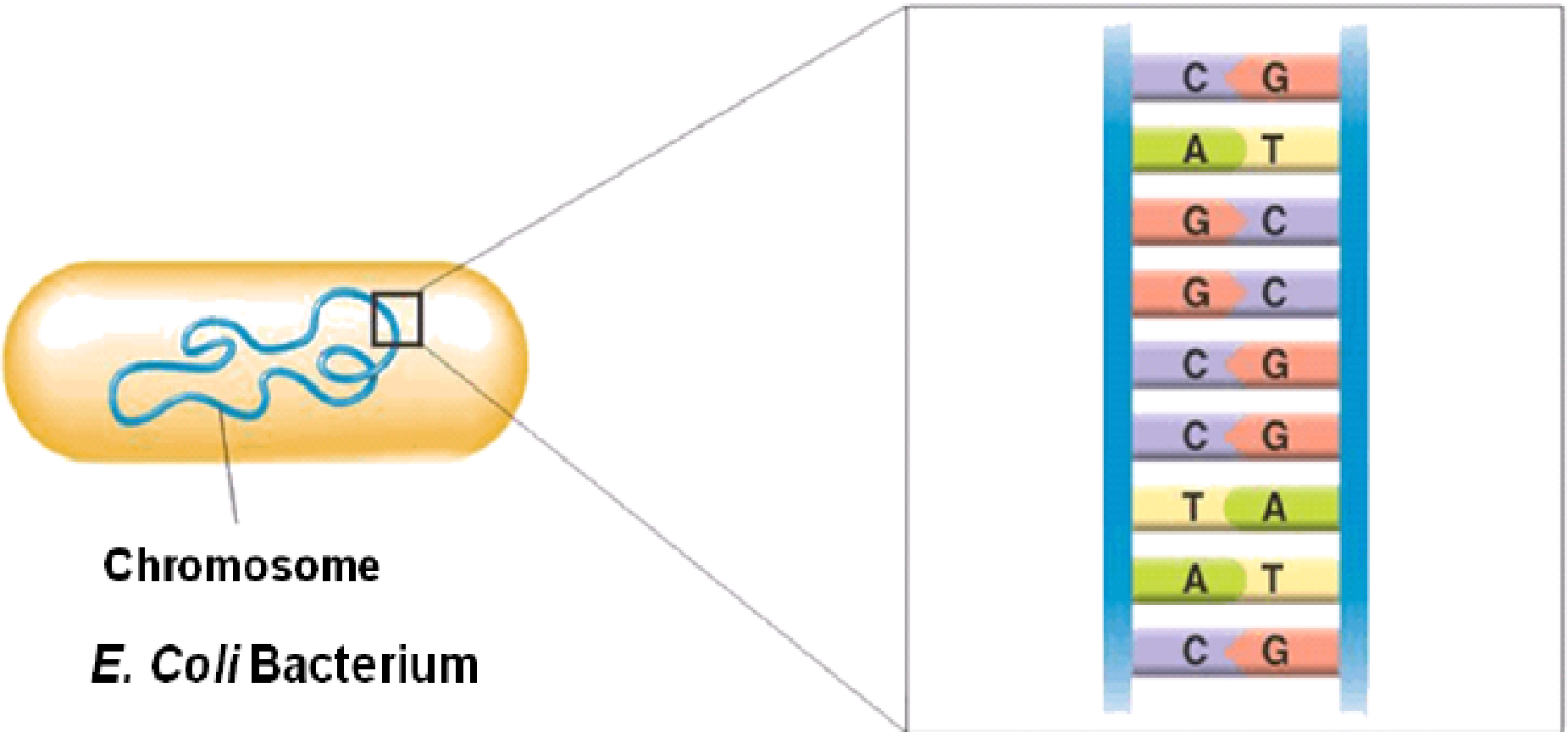
•DNA Double Helix – Watson & Crick



12-2 Chromosomes and DNA Replication



DNA and Chromosomes



Chromosome

***E. Coli* Bacterium**

**Bases on the
Chromosomes**

DNA and Chromosomes

- Eukaryotic Chromosome Structure

- contain DNA and protein, tightly packed together to form **chromatin**.

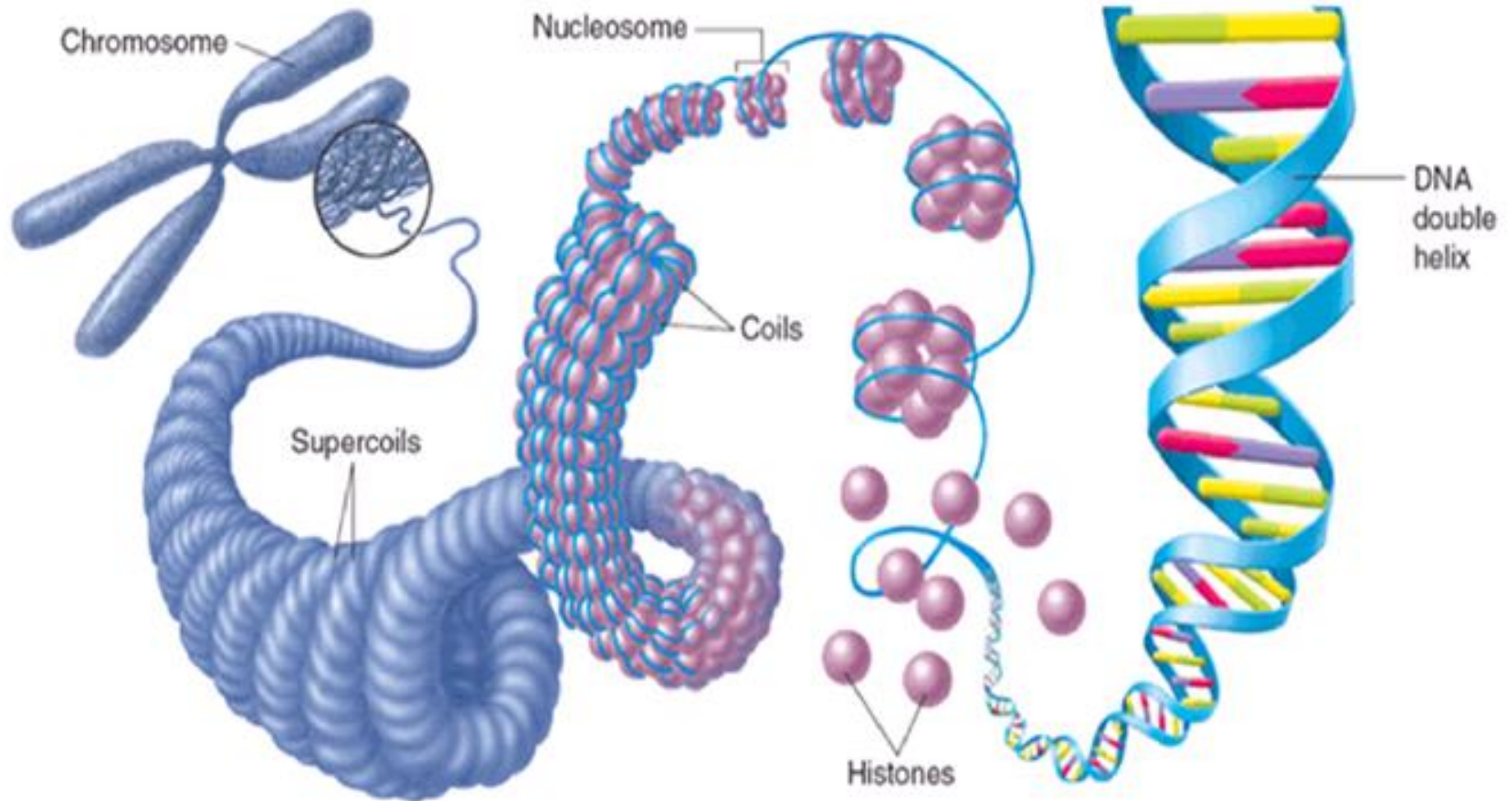
- Chromatin consists of DNA tightly coiled around proteins called **histones**.

- DNA and histone molecules form **nucleosomes**.

- Nucleosomes pack together, forming a thick **fiber**.

DNA and Chromosomes

-Eukaryotic Chromosome Structure



DNA Replication

Duplicating DNA

- Before a cell divides, it duplicates its DNA during S phase

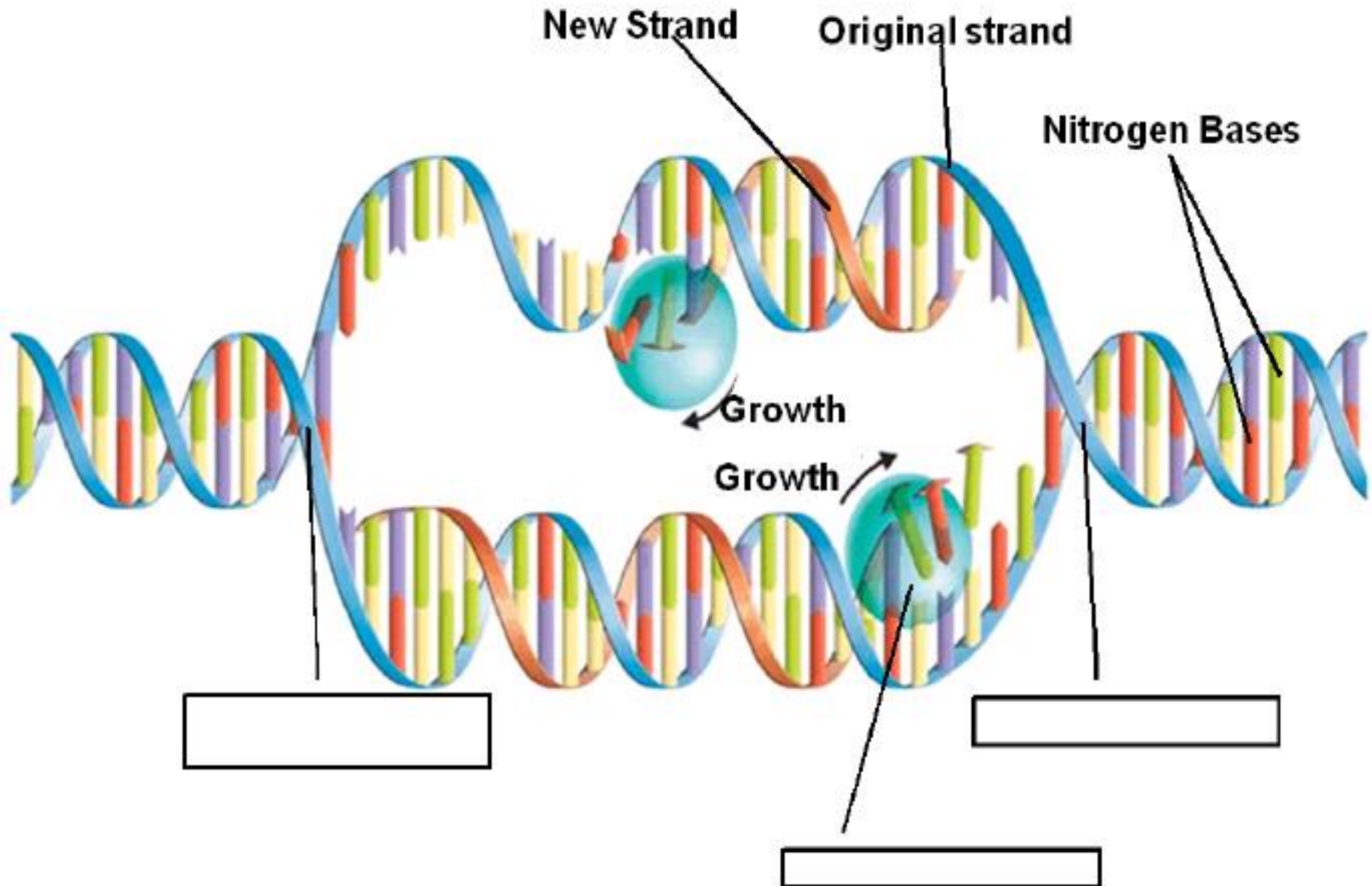
1. DNA molecules separate into two strands

2. Two new complementary strands formed by base pairing

- Each strand of the double helix of DNA serves as a template for the new strand.

- **-replication forks** - the sites where separation and replication occur

DNA Replication



DNA Replication

- How Replication Occurs

- enzymes “unzip” the molecule of DNA

- Hydrogen bonds between base pairs are broken and the two strands of DNA unwind.

- Principal enzyme: DNA polymerase

- joins individual nucleotides to produce a DNA molecule

- “proofreads” each new DNA strand

The strands separate

