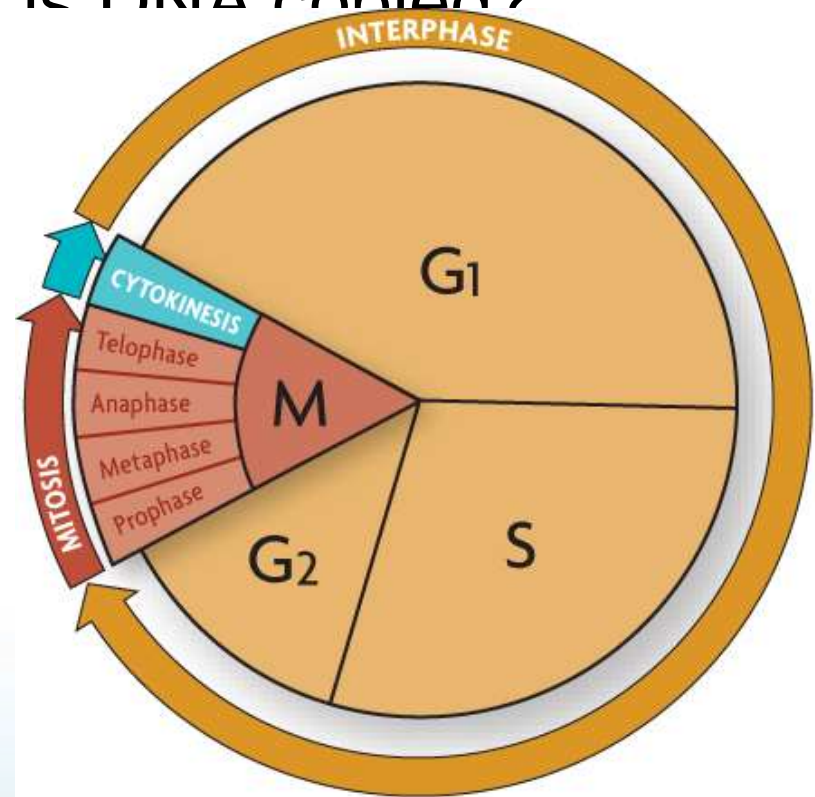


DNA Replication



Review Questions:

- 1. What are the 3 phases of the cell cycle?
- 2. What phase do cells spend the most time?
- 3. What are the 3 stages of interphase?
- 4. When in the cell cycle is DNA copied?



Review Questions:

1. What are the 3 phases of the cell cycle?

Interphase, mitosis, cytokinesis

2. What phase do cells spend the most time?

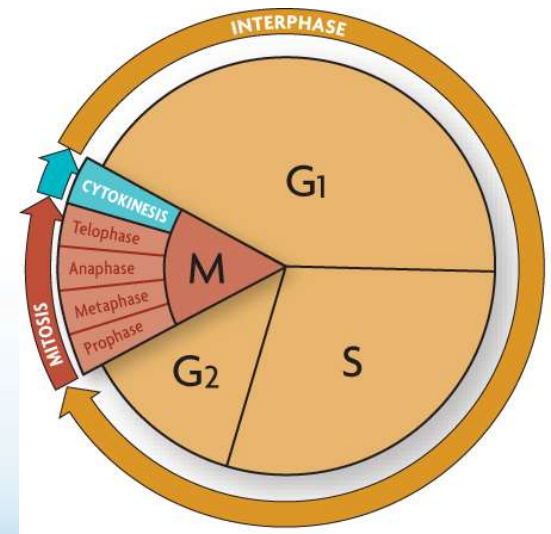
Interphase (normal growth and functions)

3. What are the 3 stages of interphase?

Gap 1, Synthesis, and Gap 2

4. When in the cell cycle is DNA copied?

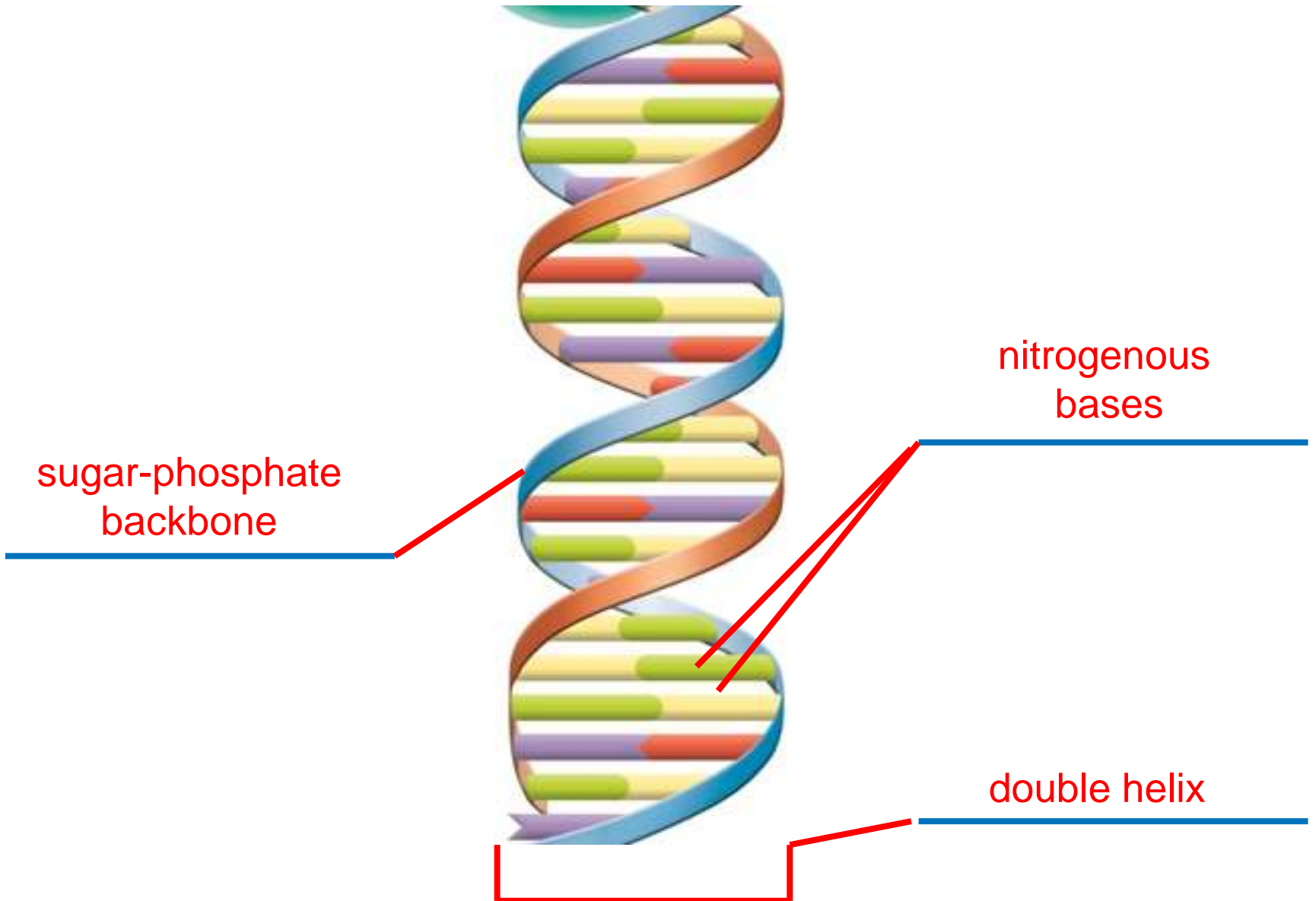
Synthesis (S-phase)



Learning Objectives

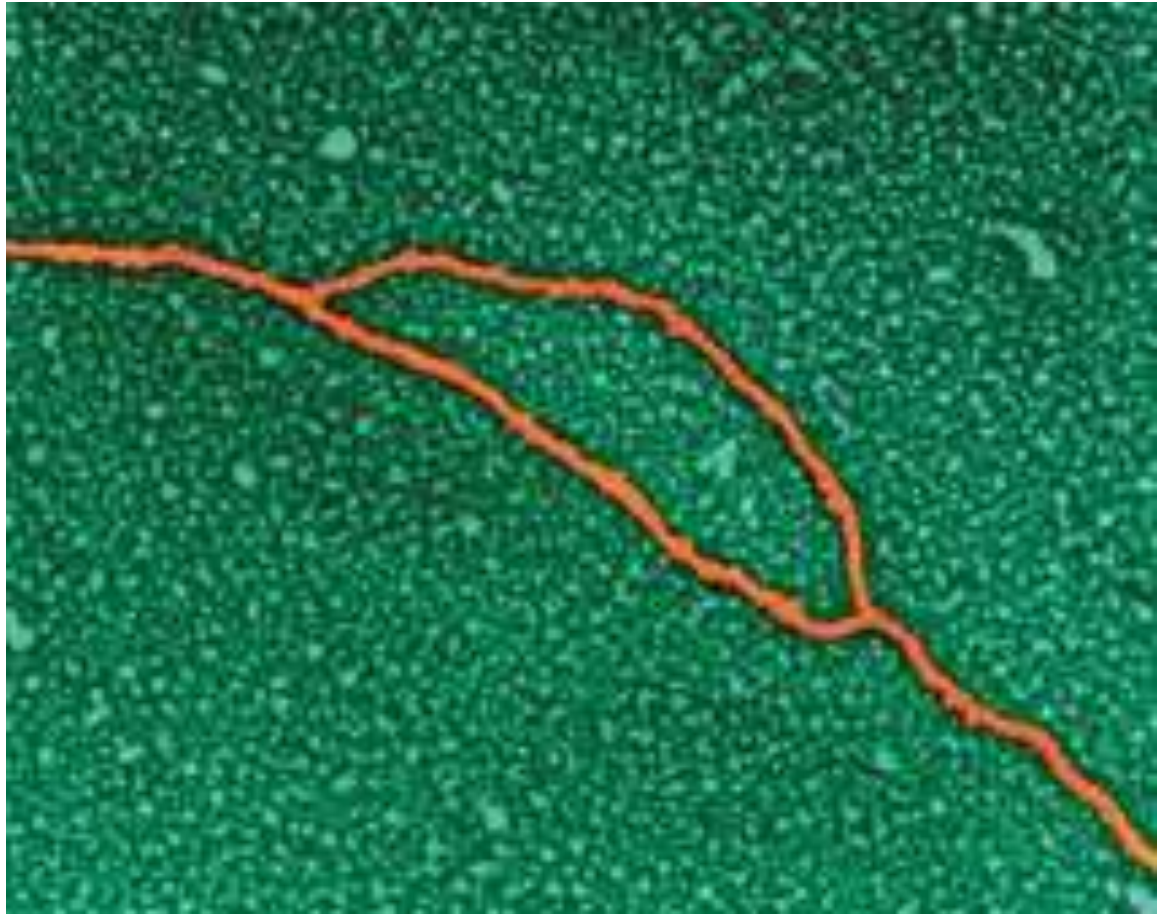
- Summarize the events of DNA replication.
- Compare DNA replication in prokaryotes with that of eukaryotes.

Review of DNA Structure



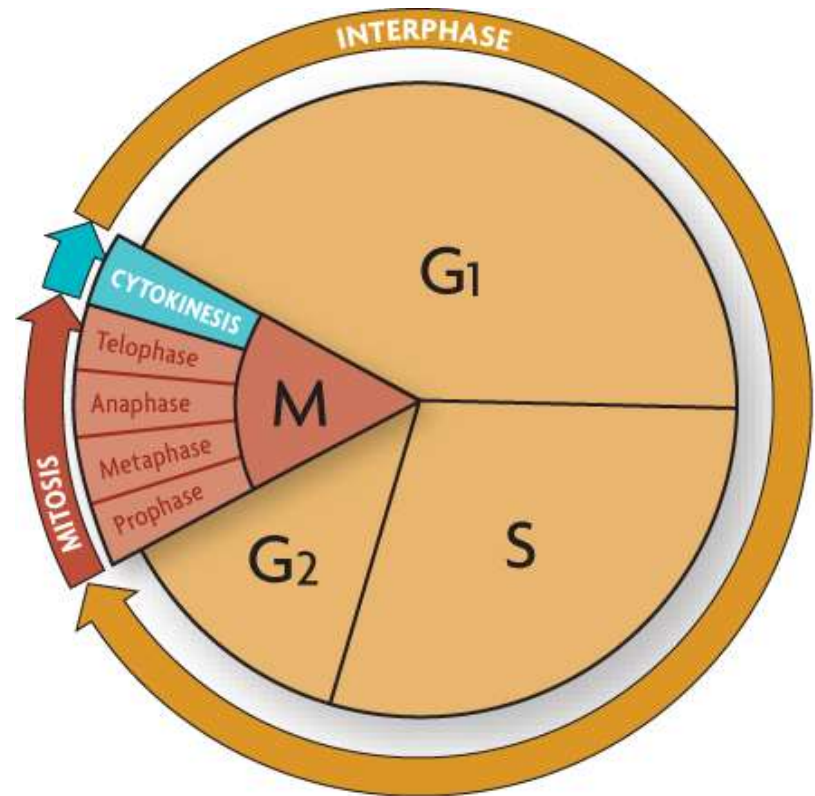
Replication copies the genetic information.

- A single strand of DNA serves as a **template** for a new strand.
- The **rules of base pairing** direct replication.



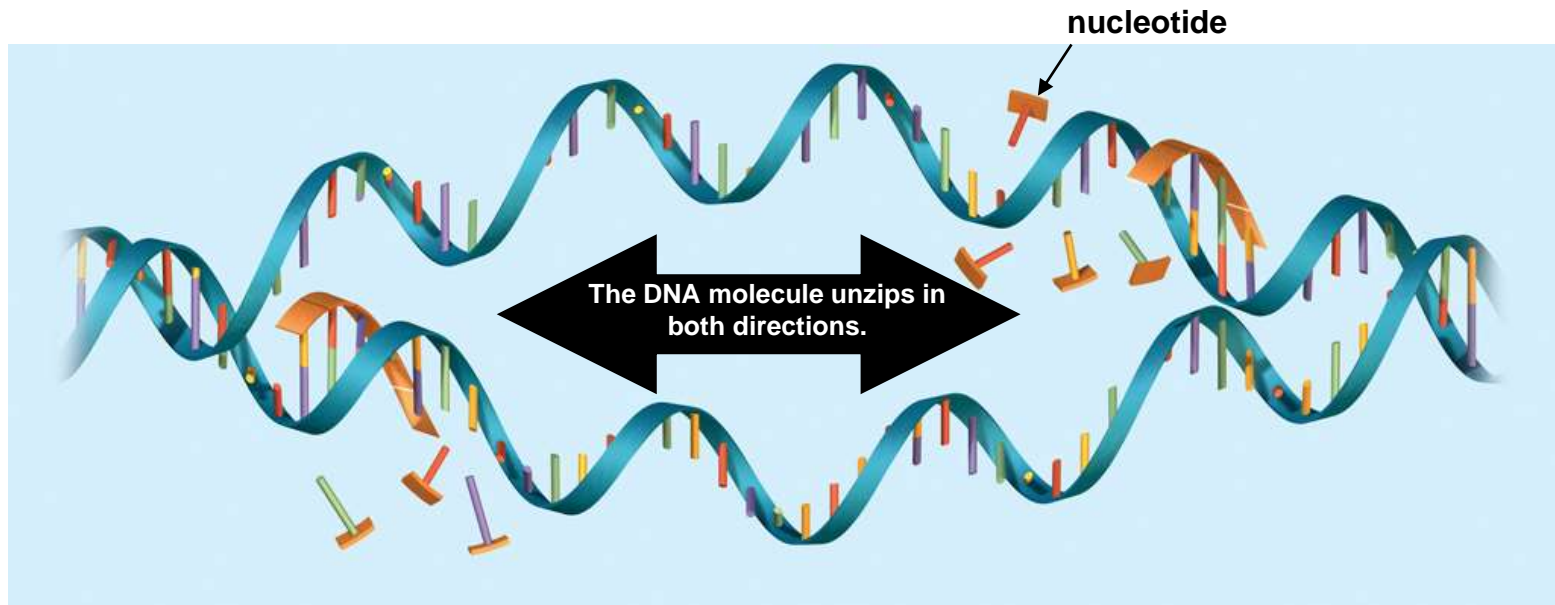
Replication copies the genetic information.

- DNA is replicated during the **S (synthesis) stage** of the cell cycle.
- Each **somatic** (body) **cell** gets a complete set of identical DNA.



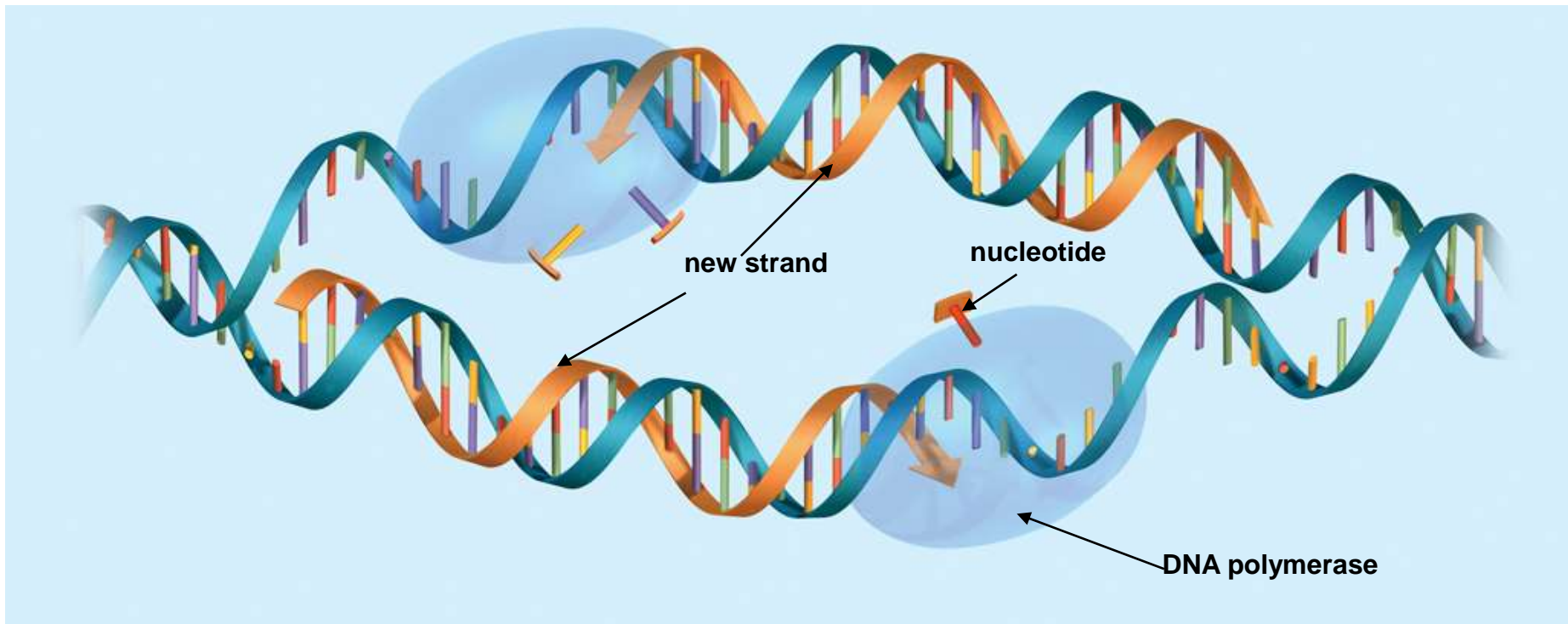
Proteins carry out the process of replication.

- DNA serves only as a template.
- Enzymes and other proteins do the actual work of replication.
 - **Helicase** enzymes unzip the double helix.
 - Free-floating nucleotides form hydrogen bonds with the template strand.



Proteins carry out the process of replication.

- **DNA polymerase** enzymes bond the nucleotides together to form the double helix.
- Polymerase enzymes form covalent bonds between nucleotides in the new strand.



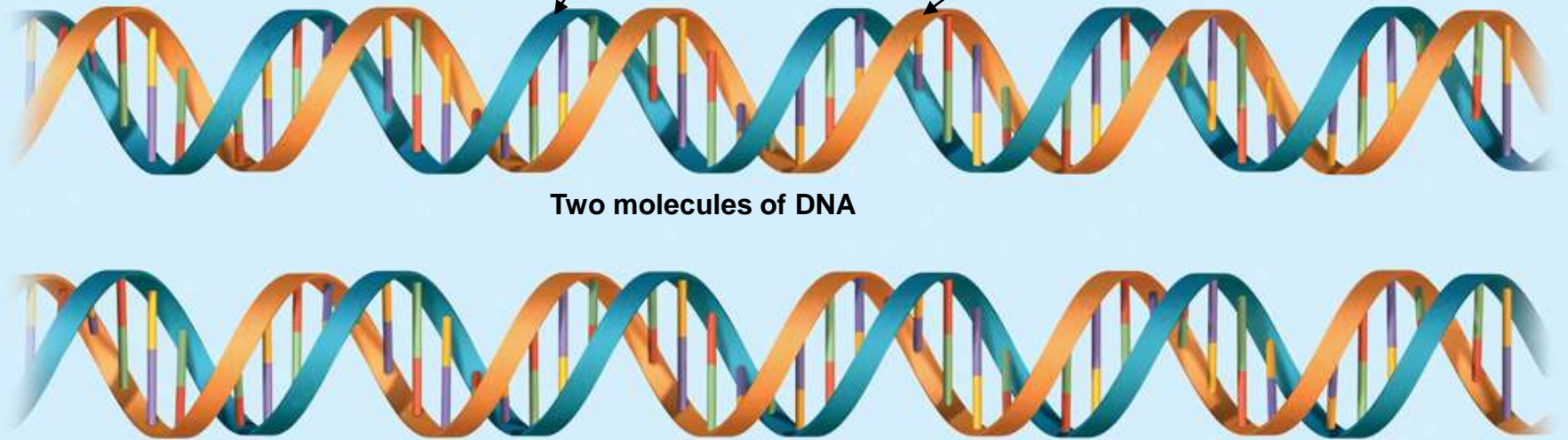
Proteins carry out the process of replication.

- Two new molecules of DNA are formed, each with an original strand and a newly formed strand.
- DNA replication is **semiconservative**.

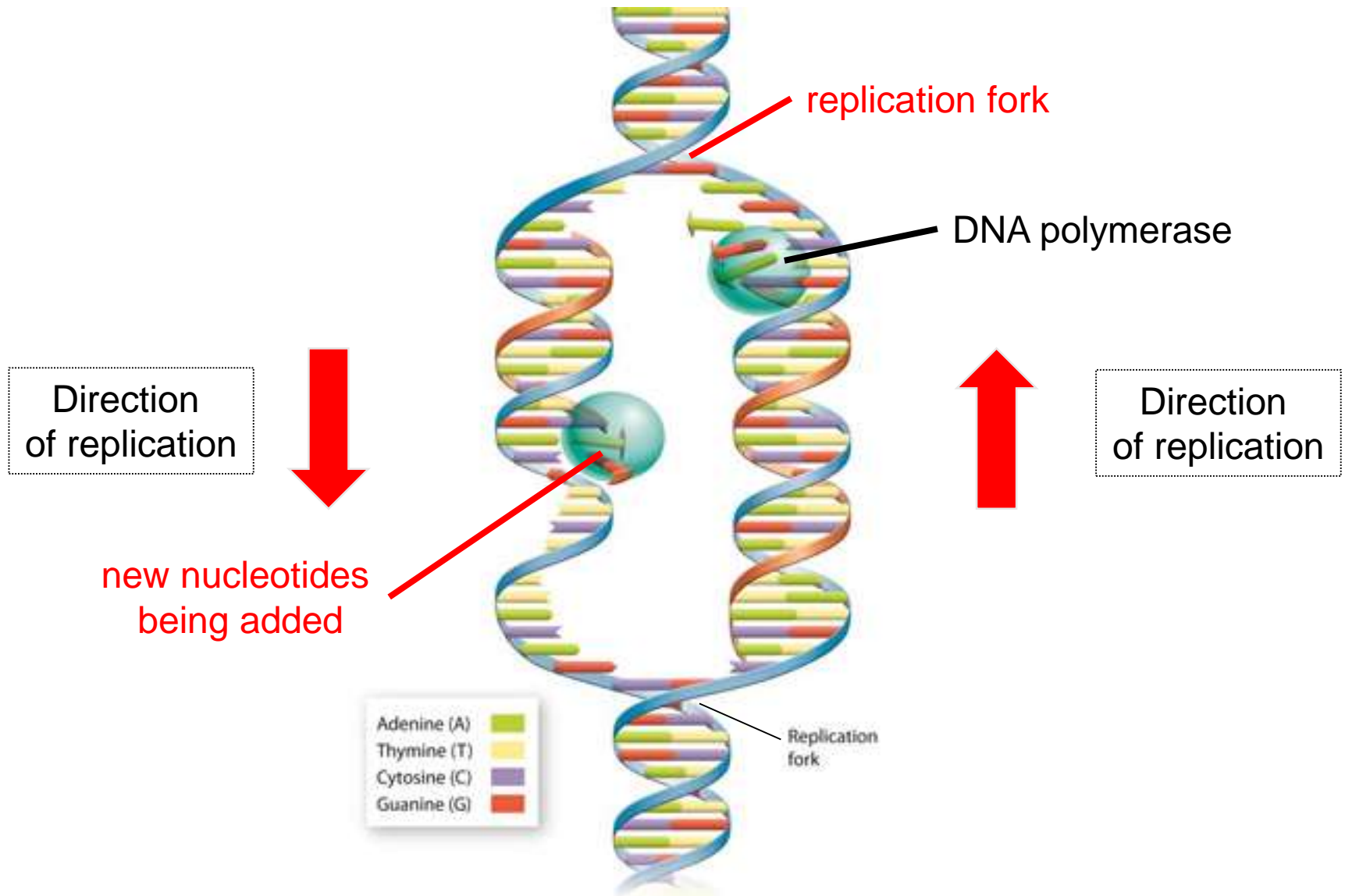
original strand

new strand

Two molecules of DNA



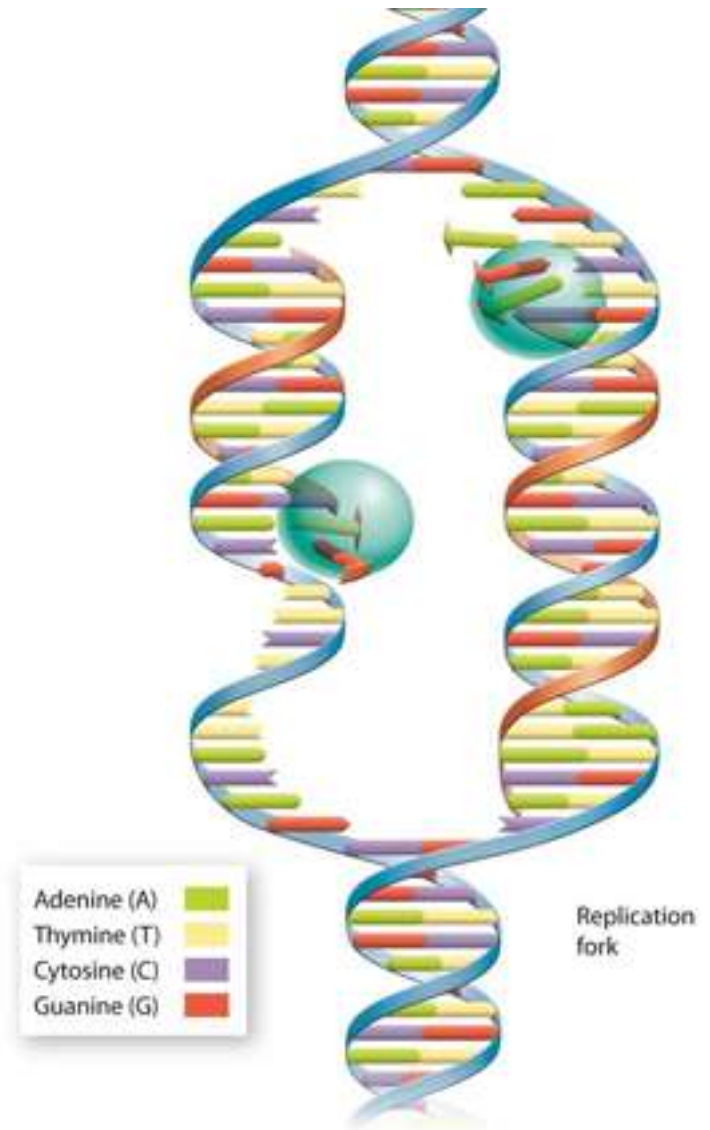
Copying DNA



DNA Replication

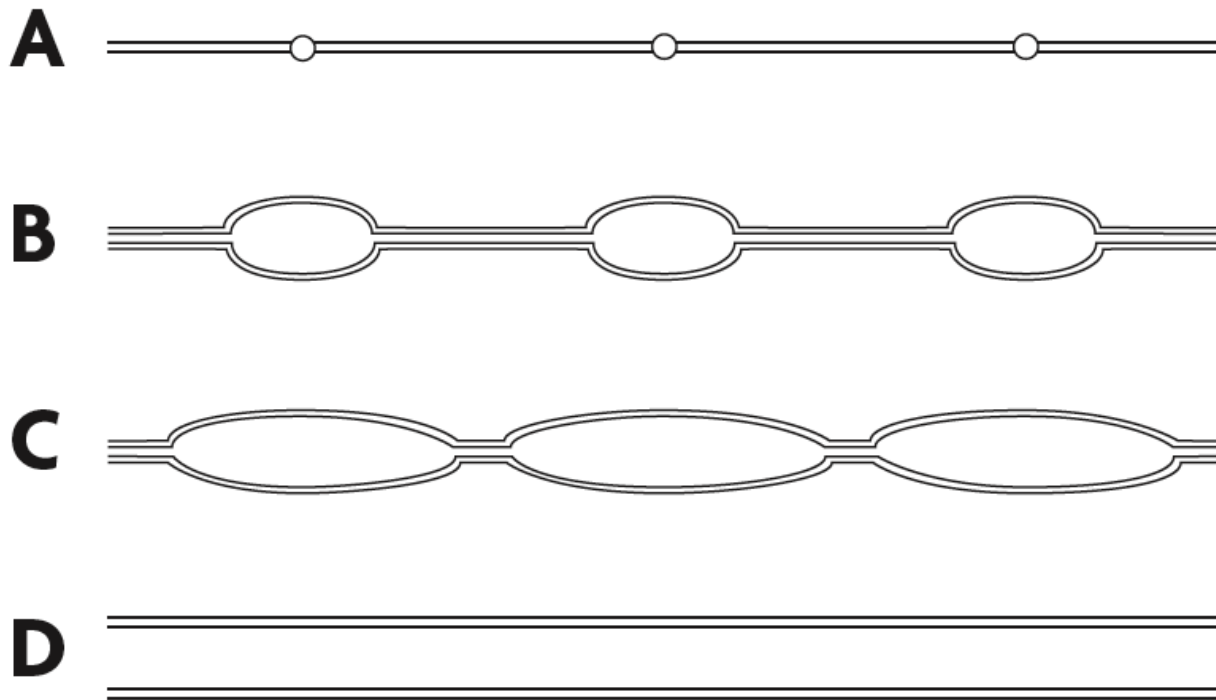
The blue strand represents the original DNA strand.

The red strand represents the new DNA strand.



Replication is fast and accurate.

- DNA replication starts at many points in eukaryotic chromosomes.



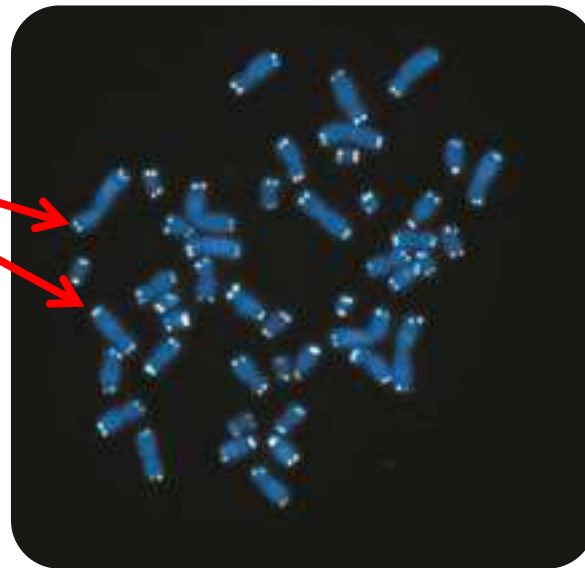
- DNA po

There are many origins of replication in eukaryotic chromosomes.

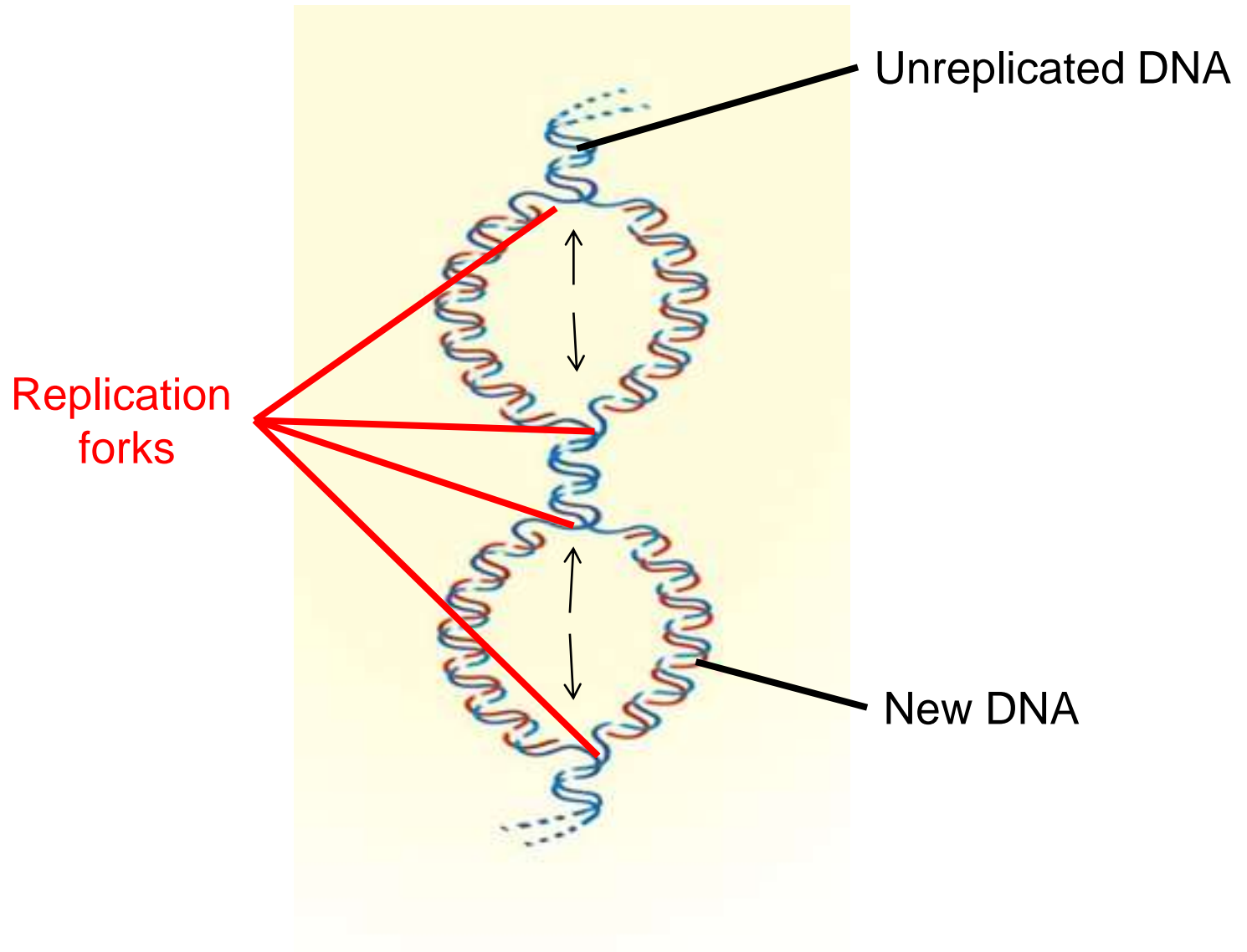
Telomeres

- **Telomeres:** the tips of eukaryotic chromosomes
- Telomerase adds short, repeated DNA sequences to telomeres as the chromosomes are replicated.

Telomeres



Eukaryotic DNA Replication



Prokaryotic DNA Replication

