

# 12–2 Chromosomes and DNA Replication

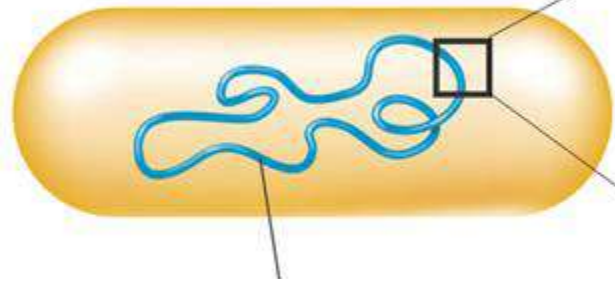


# DNA and Chromosomes

In prokaryotic cells, DNA is located in the cytoplasm.

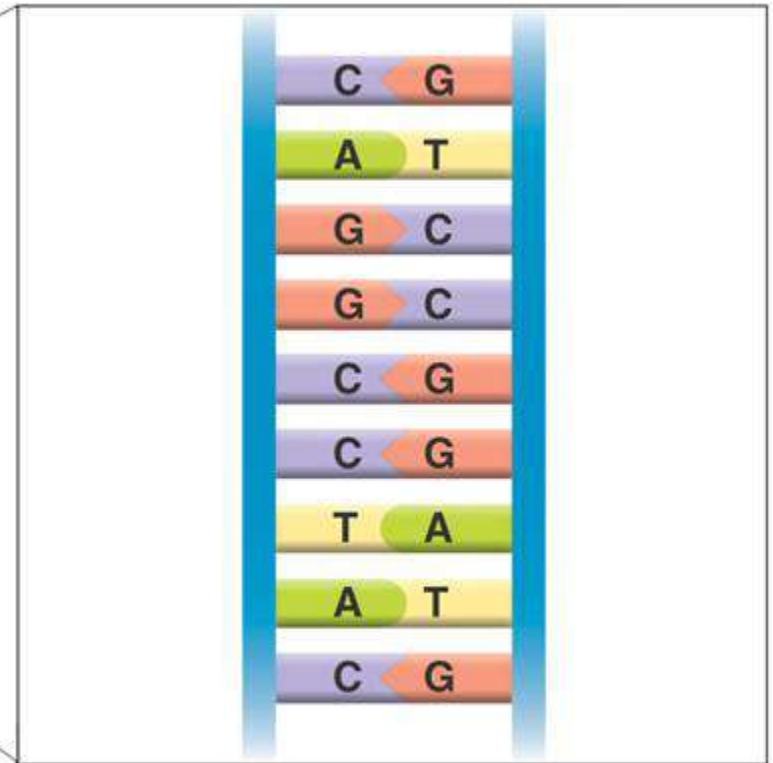
Most prokaryotes have a single DNA molecule containing nearly all of the cell's genetic information.

# 12-2 Chromosomes and DNA and Chromosomes DNA Replication



**Chromosome**

***E. Coli* Bacterium**



**Bases on the  
Chromosomes**

Many eukaryotes have 1000 times the amount of DNA as prokaryotes.

Eukaryotic DNA is located in the cell nucleus inside chromosomes.

The number of chromosomes varies widely from one species to the next.

## Chromosome Structure

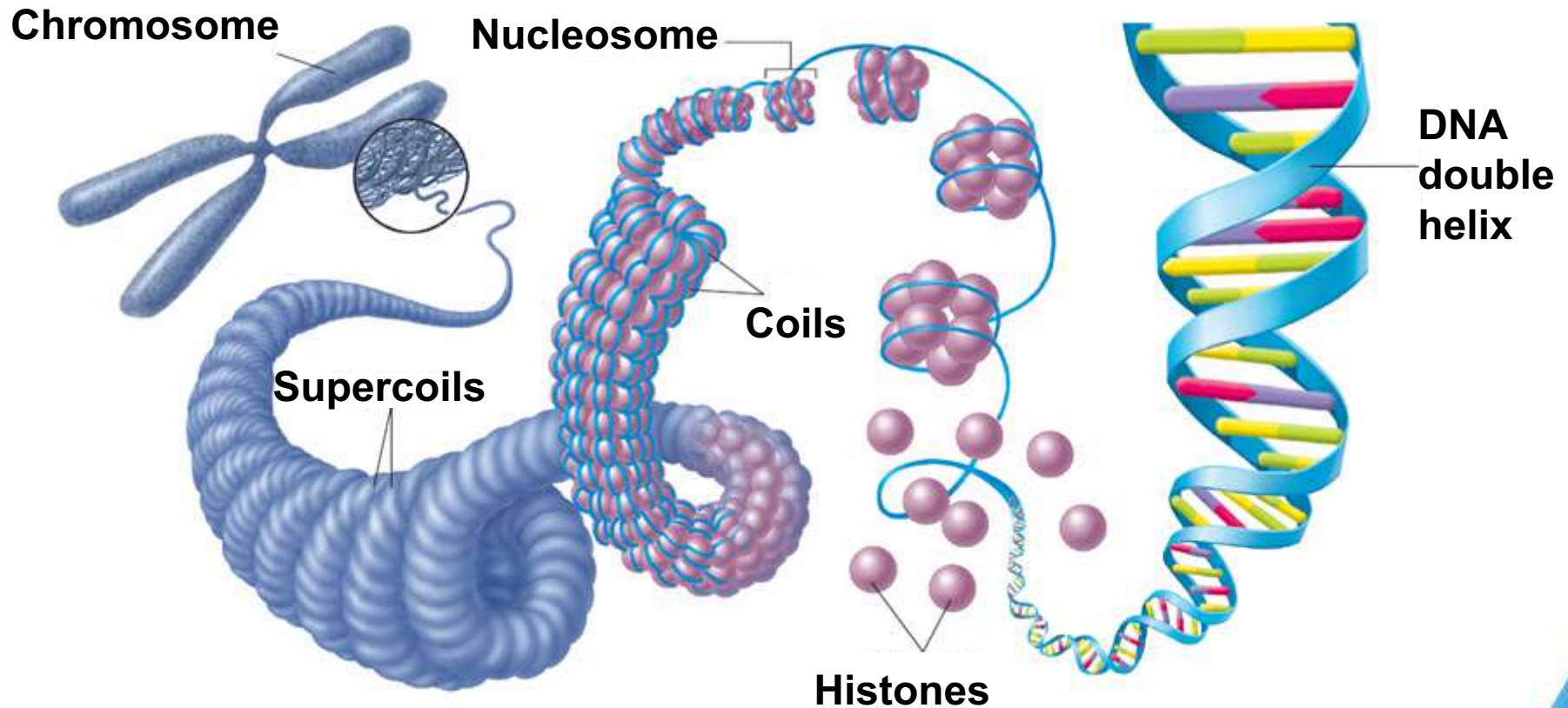
Eukaryotic chromosomes contain DNA and protein, tightly packed together to form **chromatin**.

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

DNA and histone molecules form nucleosomes.

Nucleosomes pack together, forming a thick fiber.

# Eukaryotic Chromosome Structure



# DNA Replication

Each strand of the DNA double helix has all the information needed to reconstruct the other half by the mechanism of base pairing.

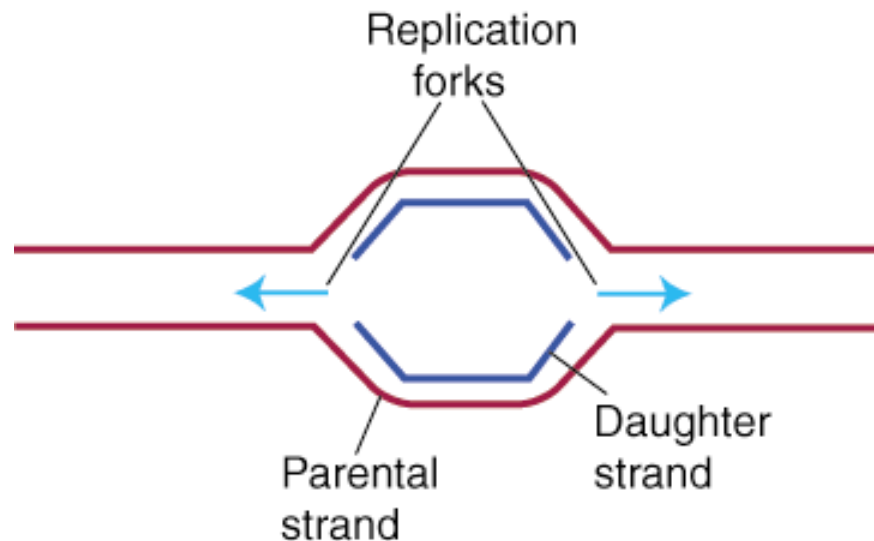
In most prokaryotes, DNA replication begins at a single point and continues in two directions.



## 12-2 Chromosomes and DNA Replication → DNA Replication

In eukaryotic chromosomes, DNA replication occurs at hundreds of places. Replication proceeds in both directions until each chromosome is completely copied.

The sites where separation and replication occur are called **replication forks**.



Copyright Pearson Prentice Hall

## Duplicating DNA

Before a cell divides, it duplicates its DNA in a process called **replication**.

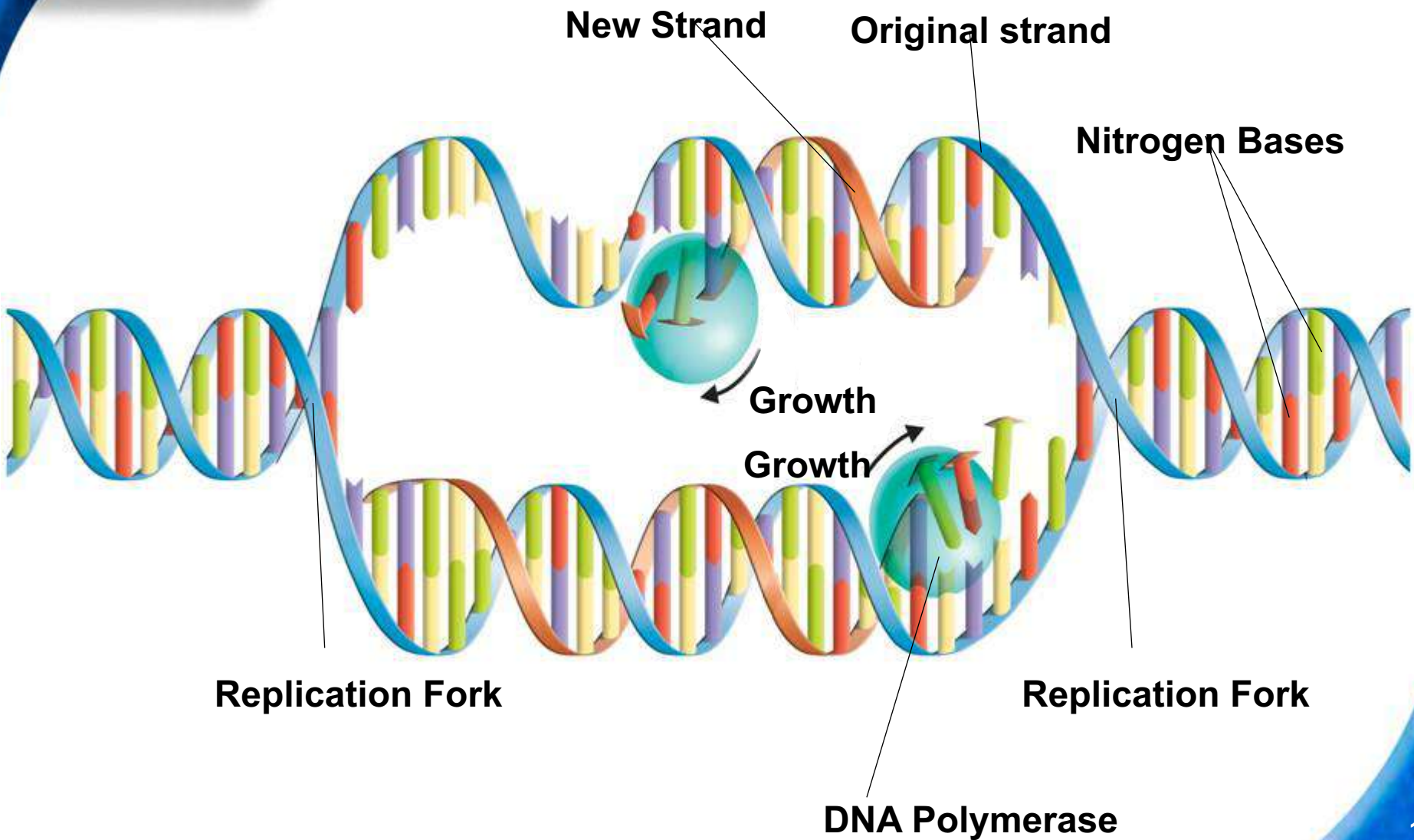
Replication ensures that each resulting cell will have a complete set of DNA.



**During DNA replication, the DNA molecule separates into two strands, then produces two new complementary strands following the rules of base pairing. Each strand of the double helix of DNA serves as a template for the new strand.**

# 12-2 Chromosomes and DNA Replication

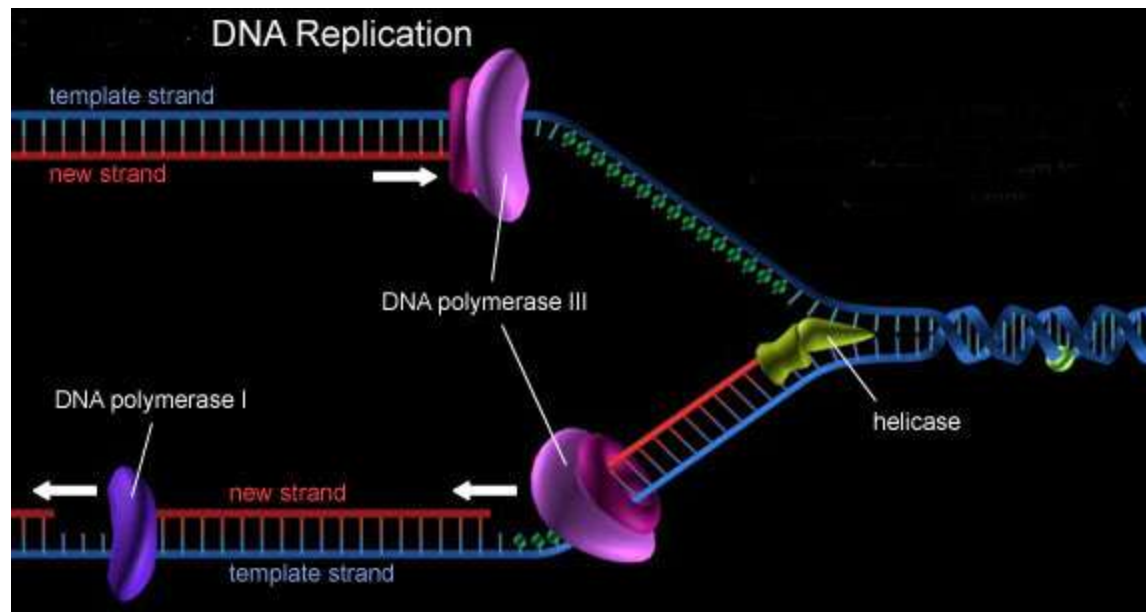
**active art**  
click to start



## How Replication Occurs

DNA replication is carried out by enzymes that “unzip” a molecule of DNA.

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



The principal enzyme involved in DNA replication is **DNA polymerase.**

DNA polymerase joins individual nucleotides to produce a DNA molecule and then “proofreads” each new DNA strand.

# 12-2 Section QUIZ

Continue to:

**Section QUIZ**

- or -

Click to Launch:



## 12-2 Section QUIZ

- 1 In prokaryotic cells, DNA is found in the
- cytoplasm.
  - nucleus.
  - ribosome.
  - cell membrane.



## 12-2 Section QUIZ

**2** The first step in DNA replication is

- producing two new strands.
- separating the strands.
- producing DNA polymerase.
- correctly pairing bases.

## 12-2 Section QUIZ

**3** A DNA molecule separates, and the sequence GCGAATTCG occurs in one strand. What is the base sequence on the other strand?

- GCGAATTCG
- CGCTTAAGC
- TATCCGGAT
- GATGGCCAG

4

In addition to carrying out the replication of DNA, the enzyme DNA polymerase also functions to

- unzip the DNA molecule.
- regulate the time copying occurs in the cell cycle.
- “proofread” the new copies to minimize the number of mistakes.
- wrap the new strands onto histone proteins.

## 12-2 Section QUIZ

- 5 The structure that may play a role in regulating how genes are “read” to make a protein is the
- coil.
  - histone.
  - nucleosome.
  - chromatin.

**END OF SECTION**