

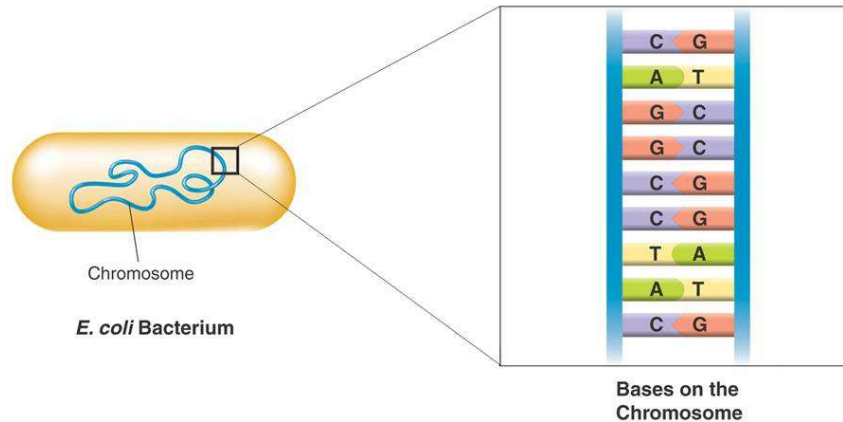
## 12–2 Chromosomes and DNA Replication

### 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.

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

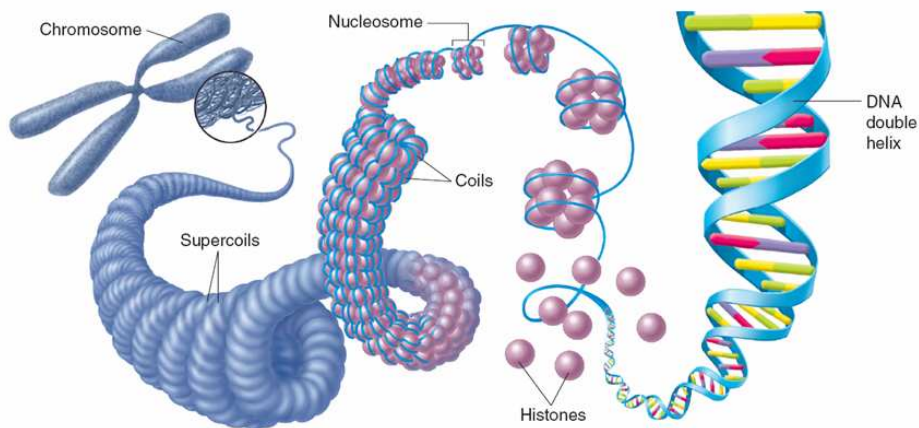
Eukaryotic chromosomes contain DNA and protein, tightly packed together to form **chromatin**.

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.

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.

## **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.**

## **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.