

# DNA, Genes, and Chromosomes



**The Instructions for Life**



# Gene

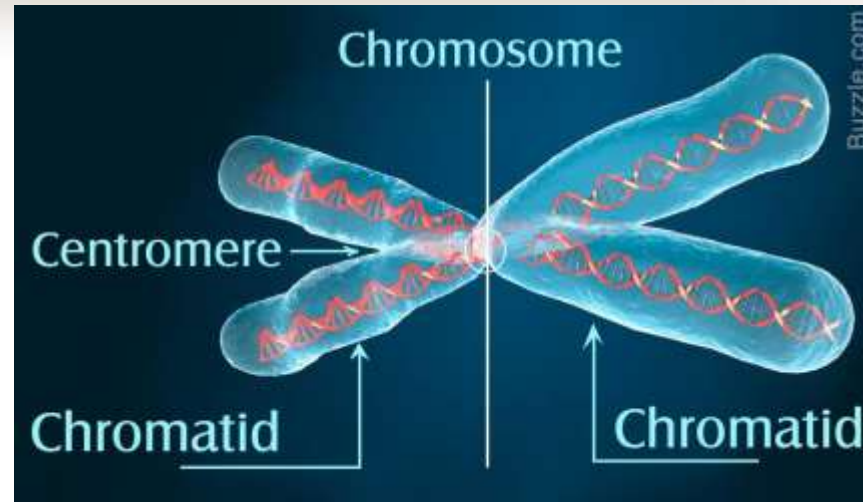
- Segment of DNA that has the information (the code) for a protein.
- A single molecule of DNA has thousands of genes.
- Remember:  
DNA to RNA to Protein

# Chromosomes

- Chromosomes are the form DNA becomes in the nucleus when the cell is preparing to divide.
- Humans have 46 chromosomes.
- One set of 23 chromosomes from mom.
- One set of 23 chromosomes from dad.

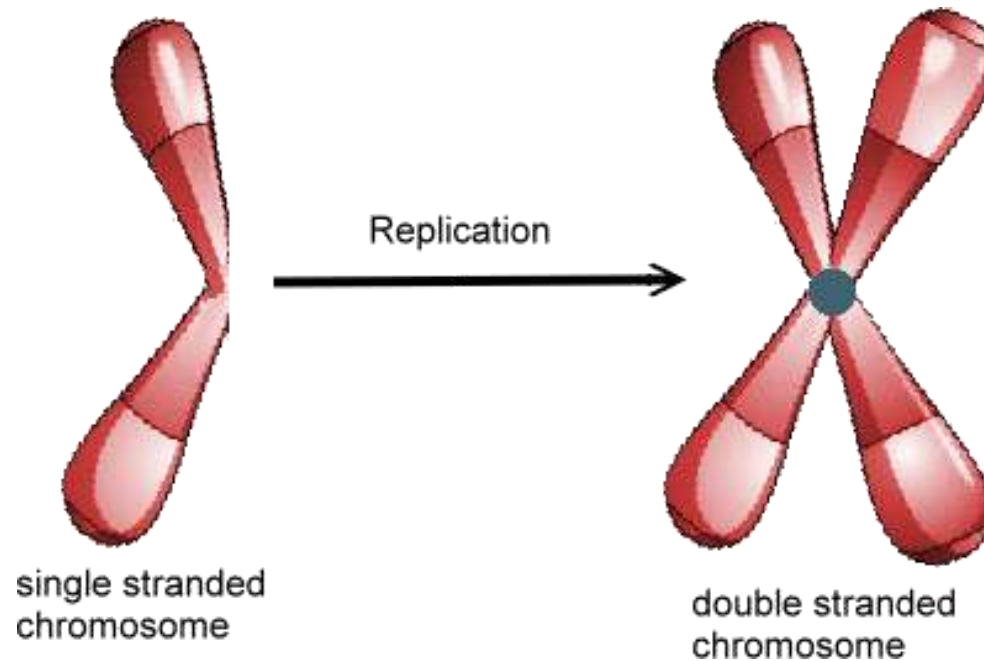


# Chromatid



- Two exact copies of a chromosome that are connected together.
- The point where they are connected near the middle is called the centromere.
- Chromatids are made when new cells are going to be made.

# Eukaryotic Chromosome Structure



Chromosomes are only visible when a cell is dividing so we usually see them in their double-stranded form.



*Each species has a specific number of chromosomes.*

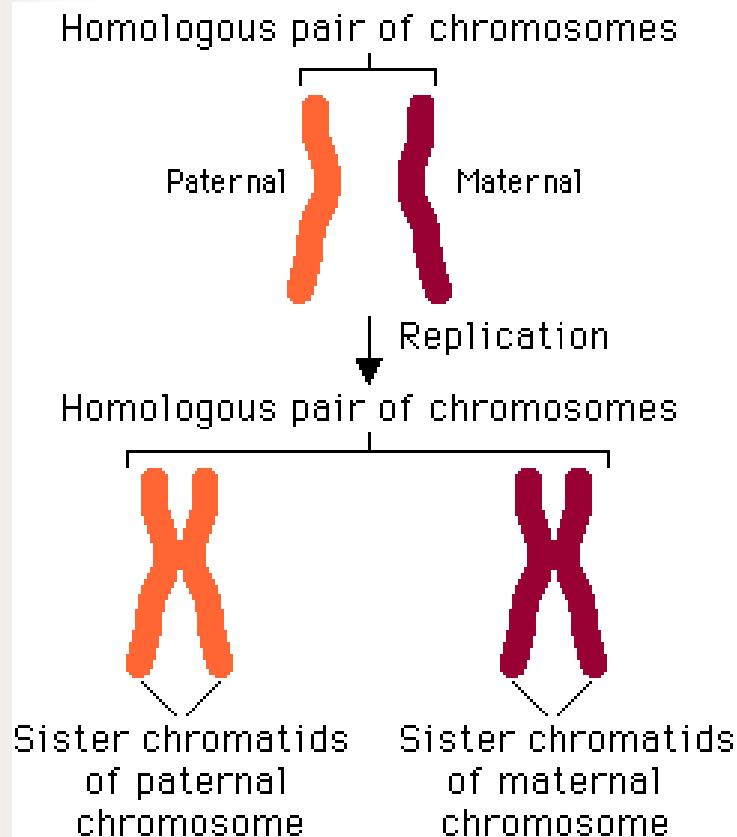
**Diploid (2n) :** two sets of chromosomes

- Found in all the non-sex cells or autosomes of an organism's body

**Haploid (n)** one set of chromosomes.

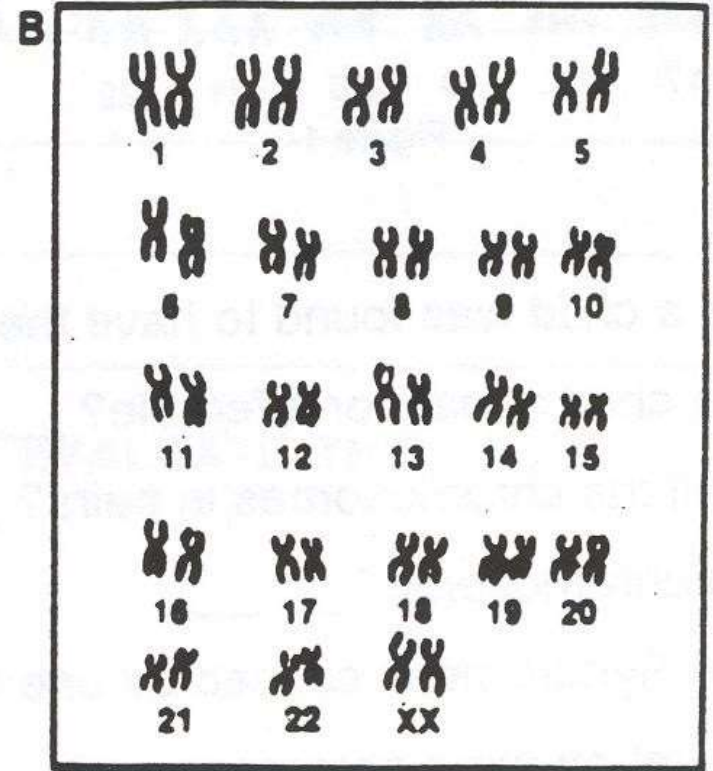
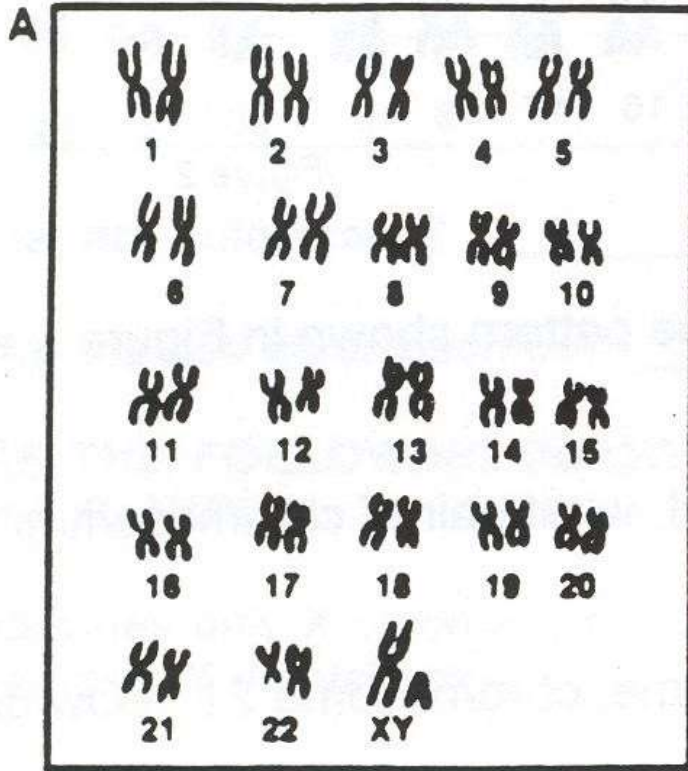
- Only sperm and egg cells (sex cells) have the haploid number.

# Homologous Chromosomes



- Chromosomes containing the same type of genetic information
- one comes from male parent, one comes from female parent

The chromosomes diagrammed below are arranged in a **karyotype**, the 46 chromosomes have been arranged in homologous pairs.







# Types of Chromosomes:

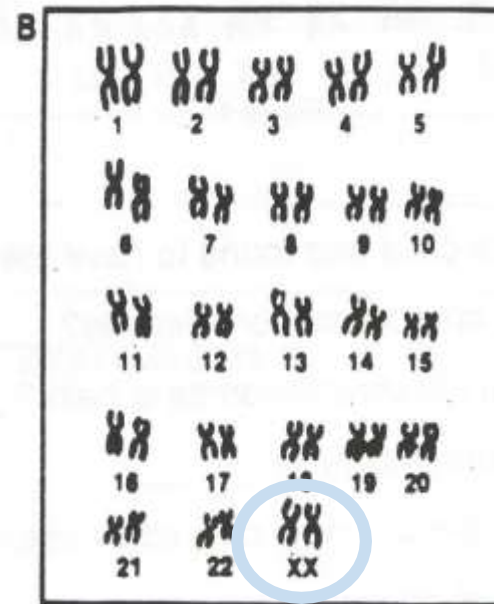
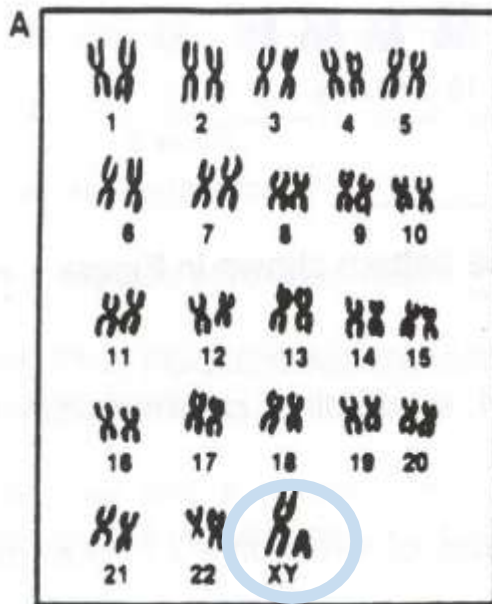
- **Autosomes:** Body chromosomes or non sex chromosomes (humans have 44 or 22 pairs)
- **Sex Chromosomes:** XX or XY (23<sup>rd</sup> pair for humans) determines the sex of the offspring

The first 22 pairs of homologous chromosomes are called **autosomes** or autosomal chromosomes.

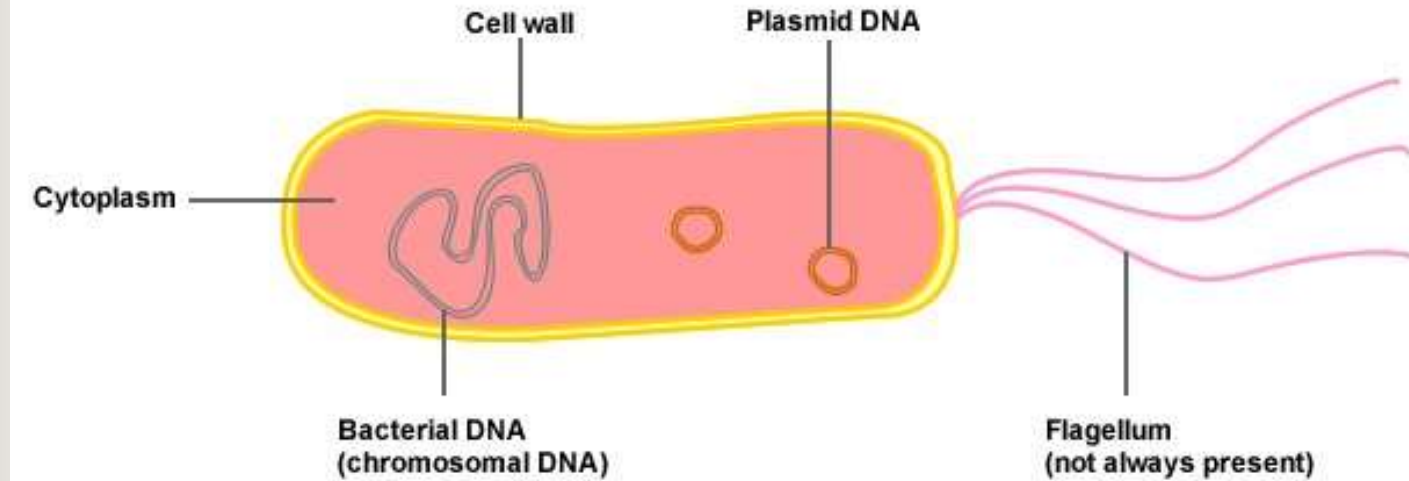
The 23rd pair of chromosomes determines the sex of the individual and are called **sex chromosomes**.

The sex chromosomes of a female are **XX**.

The sex chromosomes of a male are **XY**.



# Prokaryotic Chromosome Structure



© ABPI 2010

- Prokaryotes have a one single loop of DNA
- Where is the nucleus?
  - THERE IS NO NUCLEUS! IT'S A PROKARYOTIC CELL! ONLY EUKARYOTIC CELLS HAVE A NUCLEUS!