

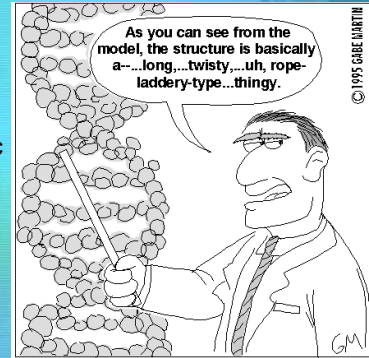
### What do you already know?

- What organelle is known as the "control center" of the cell?
  - nucleus
- What structures are found in the nucleus?
  - chromosomes
- What are chromosomes composed of?
  - DNA
- What are specific sections of chromosomes that code for traits?
  - genes
- How do genes and chromosomes control the activity of the cell?
  - By producing proteins that regulate cellular functions or become parts of cells.



### Storing Genetic Information

DNA



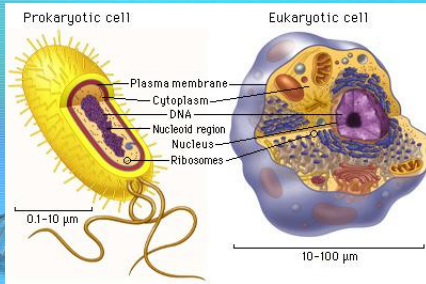
1953: The structure of the DNA molecule is first described.

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### Where is DNA located...

in a prokaryotic cell?

in a eukaryotic cell?



### Most prokaryotes have one large circular DNA in their cytoplasm.

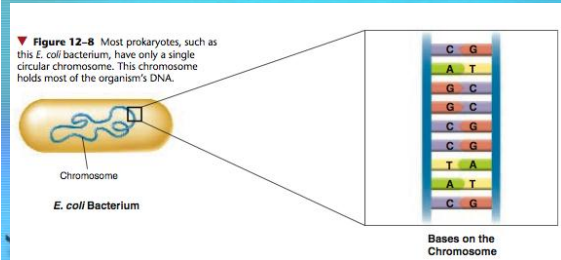
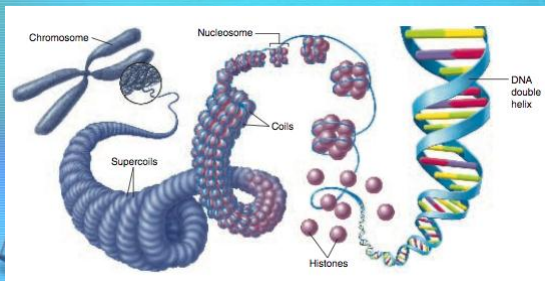


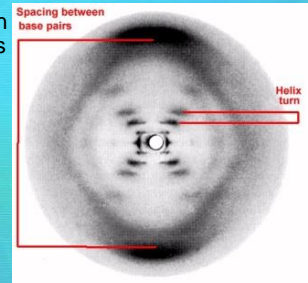
Figure 12-8 Most prokaryotes, such as this *E. coli* bacterium, have only a single circular chromosome. This chromosome holds most of the organism's DNA.

### Eukaryotes have DNA in chromosomes located in the cell's nucleus



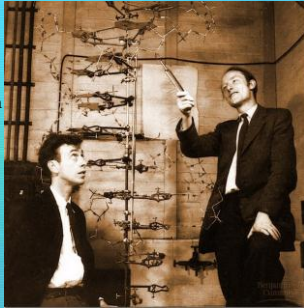
### Discovering the Structure of DNA

- Rosalind Franklin took x-ray photos of DNA



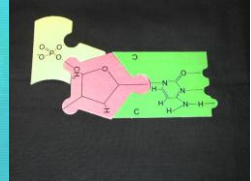
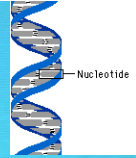
### James Watson & Francis Crick

- Discovered the structure of DNA in 1953
- Won the Nobel Prize in Medicine & Physiology in 1962



### Structure of DNA

- DNA is a nucleic acid. The monomer of a nucleic acid is a nucleotide.
- 3 parts to a DNA nucleotide
  - Sugar (deoxyribose)
  - Phosphate
  - Nitrogen Base

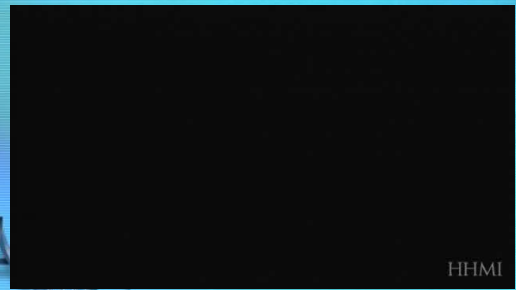


### Nitrogen Bases

- 4 types of nitrogen bases
  - Adenine (A)
  - Thymine (T)
  - Guanine (G)
  - Cytosine (C)
- Held together by hydrogen bonds



### The Nitrogen Bases



HHMI

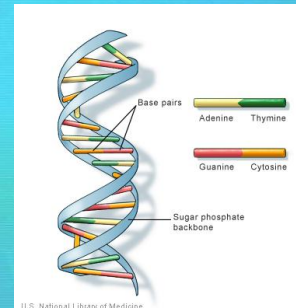
### Percentages of DNA Nucleotides in Selected Organisms

Source of DNA	Adenine (A)	Cytosine (C)	Guanine (G)	Thymine (T)
Human	30.2%	18.8%	18.8%	32.2%
Rat	28.6%	21.6%	21.4%	28.4%
Sea Urchin	31.2%	19.1%	19.2%	30.5%
Salmon	29.2%	20.8%	21.9%	28.1%



### Structure of DNA

- Shape: Double Helix
- Chargaff's Ratios
  - Complementary base pairing
    - Equal amounts of
      - A & T
      - G & C



U.S. National Library of Medicine

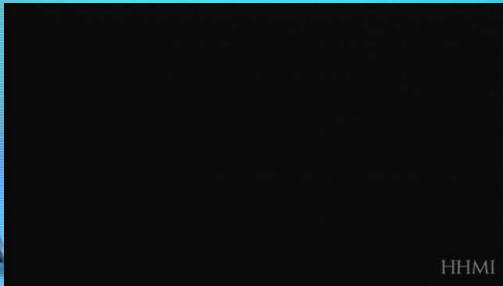
## Chargaff's Rule



## Watson Discovering Base Pairing



## Complementary Base Pairing

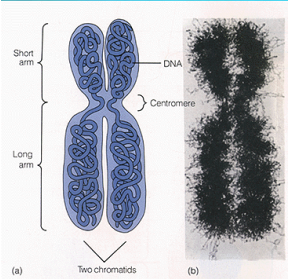


## Complementary Base Pairing Practice

- What is the complementary sequence in each of the following examples?
- 5' - ACT TAG GGA CCT - 3'
- 5' - GAG TCC AAC GAT - 3'

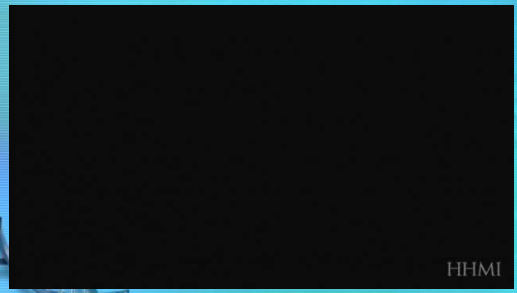


## How does your DNA fit into a cell?



- All the DNA from a single cell would be over 6 feet long!
- DNA is wrapped around proteins to form chromosomes

## DNA Packaging into Chromosomes



## How many chromosomes does one cell hold?

- It all depends on what organism you're talking about.
- Human – 46 chromosomes
- Mosquito – 6
- Onions – 16
- Carp 104



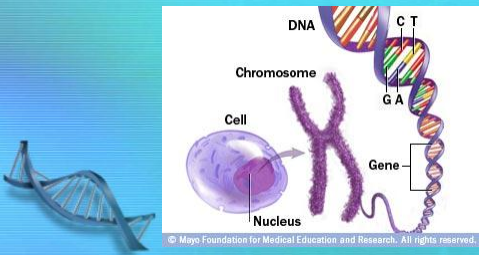
## DNA Function

- Contains genes that direct the synthesis of proteins



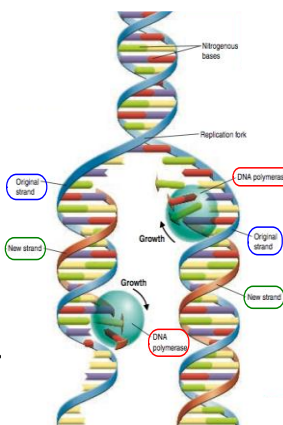
## Gene

- Section of a chromosome that codes for a specific trait.



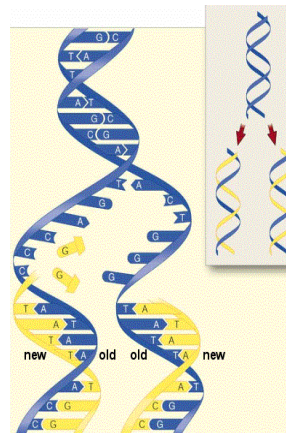
## Cell Division

- Cells must divide for an organism to grow and develop.
- Before a cell divides it copies its DNA in a process called replication.



## DNA Replication

1. An enzyme unzips the parent DNA strand.
2. Enzymes help new nucleotides pair up with parent strands.
3. End result is two identical strands of DNA



- Occurs in the nucleus
- DNA replication is called Semi-Conservative because the Daughter DNA strands are "half-old, half-new"

## DNA Replication



## Ticket out the Door

- 4 Types of Nucleotides
- 3 Parts of a Nucleotide
- 2 People credited with discovering the structure of DNA
- 1 main function of DNA

