

# DNA

DNA

Nucleotide

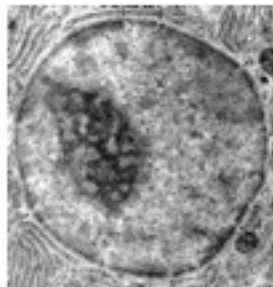
Nitrogenous Base

Antiparallel

Chromatin

## What's In the Nucleus?

Life Science: Molecular



# Deoxyribonucleic Acid

**Deoxyribonucleic acid** (DNA) is a **nucleic acid** that contains the instructions for building the proteins that make up a cell.



# Deoxyribonucleic Acid

DNA is like a **cook book**, since it contains the instructions needed to construct all the parts of different cells.

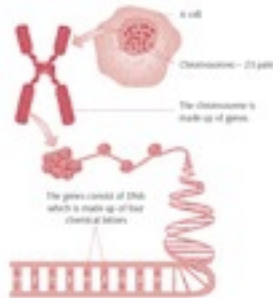


# Deoxyribonucleic Acid

DNA encodes our genes.

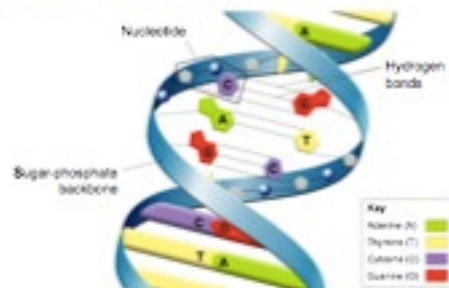
Genes make proteins.

Proteins make us what we are.



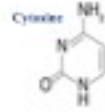
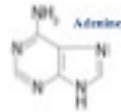
## Nucleotides

DNA is a polymer formed by combining **nucleotides** (the monomers of DNA), Nucleotides are composed of a **sugar**, a **phosphate**, and a **base**.

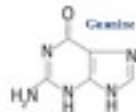
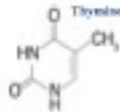


# Nitrogenous Bases

**Nitrogenous bases** are nitrogen containing molecules having the characteristics of a base. DNA is composed of only 4 different bases.



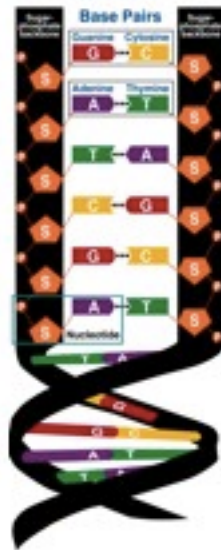
Adenine  
Thymine  
Cytosine  
Guanine



# Complementary Bases

DNA bases are complementary; meaning...

Adenine always pairs with Thymine  
Cytosine always pairs with Guanine



# Deoxyribonucleic Acid

DNA is a **macromolecule** (very large) made up of many nucleotides.

```
GAATTCCTCTTTGGTATCCAATGAAGAAATCGAATCCATACCCATAGCTATAAAAAACAT
TTCAGGAGAAAAAAGACCGAAGCTGCTCAATAGGGCCAAATGATTCGTTTCAAAAAA
GTGAAACTTGCAGCTTACTTCGGCATGTCCGGTCATTTTGGAAAAATTCATCTTACT
CAACCATATTTAAAGTCGCATTTAAAAAACTTGTGAAAAATTTTTAAATATACTTG
TTCTTCTGTGGTGGCTTACAAAAATCTTGAACCTCTGGAATTGATCAAGCAGATAGAGG
AACGAAATACTGGAAATAACAGTTAAAGATCGTGTCTCTTTAAAAAAATTTAGAAAGCT
ACCAAAACAAGCAAAATCAAGTGTATTGCACTAATGCCAAAAACAAGTCTCTCTT
ACATATTCGAAAAATAAATCTTATATATAATTCGGTACTACAAAGGTATAGTTT
TGGATAACAGGCATGTGTTTAAATCTTACAAAAATCTTCCAAAAAGTTTAAATTTG
TTAACCCTTCGAAATGCTCATCAAAATCGEATCTCCGAAAAATGCTTTTATGCTAATAG
TATCTTACTTCCACCACATAATCTACGAACTATCAATGTTTATGATGGTCAGGTTACGA
GTTTGTAAACAAGTGATTTGAATCTGATAATCGAAGAGTTGCTAATAATGAGACAAAT
GCAAAAATACAAAAAATCTTGGATCTATCGATAACAGCCGAGGTGCCAATCCATATGC
TACAAAAAATAAAGCTTACTTTGGATACTTTGACAGGTGGACACTCAAAAGAATCTTAT
TGGCAAGTTATATTAATGGCAAAAGTATCTCTGAGACTGCCAGAGCTGTAAATCGAAACC
TCTATGAATAAAATCGCTTTTATGAAATACCATCTTACATTTTAAACAAGTTAAGAGA
TGTGTCTTTTATAATCACGTTACGAAAGATAAACAATCTCAAAAGTCTTCAAAAAGAAC
AAGCTTTTCTAACATATATCAAAAAGTGATCATAATCTGAAAAATCCTTATATGGTTAT
GATTTAGCACAGAAAGATGGATATTTAAOCTTGGCTCCTAATTTGGTGATATTTTCGA
```

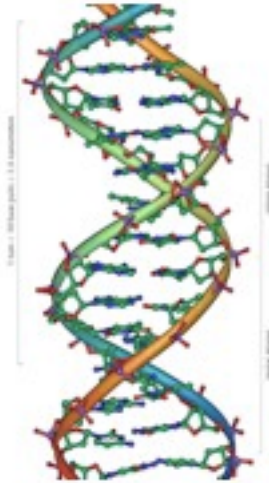
# Deoxyribonucleic Acid

The *sequence of bases* in the DNA encode the genetic information of an organism.

```
GAATTCCTCTTTGGTATCCAATGAAGAAATCGAATCCATACCCATAGCTATAAAAAACAT
TTCAGGAGAAAAAAGACCGAAGCTGCTCAATAGGGCCAAATGATTCGTTTCAAAAAA
GTGAAACTTGCAGCTTACTTCGGCATGTCCGGTCATTTTGGAAAAATTCATCTTACT
CAACCATATTTAAAGTCGCATTTAAAAAACTTGTGAAAAATTTTTAAATATACTTG
TTCTTCTGTGGTGGCTTACAAAAATCTTGAACCTCTGGAATTGATCAAGCAGATAGAGG
AACGAAATACTGGAAATAACAGTTAAAGATCGTGTCTCTTTAAAAAAATTTAGAAAGCT
ACCAAAACAAGCAAAATCAAGTGTATTGCACTAATGCCAAAAACAAGTCTCTCTT
ACATATTCGAAAAATAAATCTTATATATAATTCGGTACTACAAAGGTATAGTTT
TGGATAACAGGCATGTGTTTAAATCTTACAAAAATCTTCCAAAAAGTTTAAATTTG
TTAACCCTTCGAAATGCTCATCAAAATCGEATCTCCGAAAAATGCTTTTATGCTAATAG
TATCTTACTTCCACCACATAATCTACGAACTATCAATGTTTATGATGGTCAGGTTACGA
GTTTGTAAACAAGTGATTTGAATCTGATAATCGAAGAGTTGCTAATAATGAGACAAAT
GCAAAAATACAAAAAATCTTGGATCTATCGATAACAGCCGAGGTGCCAATCCATATGC
TACAAAAAATAAAGCTTACTTTGGATACTTTGACAGGTGGACACTCAAAAGAATCTTAT
TGGCAAGTTATATTAATGGCAAAAGTATCTCTGAGACTGCCAGAGCTGTAAATCGAAACC
TCTATGAATAAAATCGCTTTTATGAAATACCATCTTACATTTTAAACAAGTTAAGAGA
TGTGTCTTTTATAATCACGTTACGAAAGATAAACAATCTCAAAAGTCTTCAAAAAGAAC
AAGCTTTTCTAACATATATCAAAAAGTGATCATAATCTGAAAAATCCTTATATGGTTAT
GATTTAGCACAGAAAGATGGATATTTAAOCTTGGCTCCTAATTTGGTGATATTTTCGA
```

# DNA Structure

DNA is a **double helix** composed of two strands of nucleotide polymers.



# Double Helix

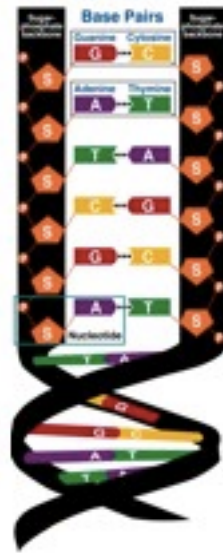
James Watson and Francis Crick discovered the structure of DNA in 1953.



# Antiparallel Strands

The two strands are **antiparallel**, running in opposite directions.

DNA is read and copied from the 5' end to the 3' end.



# DNA Organization

Within cells, DNA is packaged in the form of **chromatin**; DNA is wrapped around proteins called histones (compact and organized).

