

# Structure of DNA

What's in your genes?

# What's in your genes? The Breakdown

## I. DNA Deoxyribonucleic Acid

Since the 1920s scientists have known the DNA molecule is a very long chain of repeating units.

### A. Location

- 1. in nucleus
- 2. what makes up chromatin

### B. Chromosomes- contain genetic information

- 1. Genes- sequence of DNA that codes for a protein and thus determines a trait
- 2. Chromatin- consists of tightly coiled DNA around proteins

The monomer (small units) of DNA

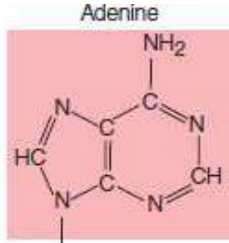
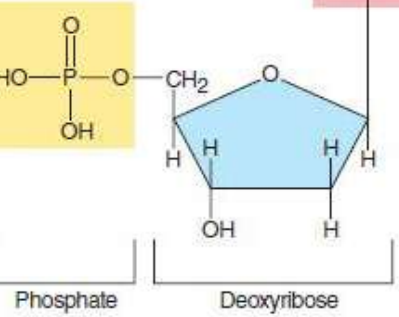
C. **Nucleotide**- the base unit of DNA. Made up of a sugar, phosphate group, and a nitrogenous base

1. Backbone- 2 components:

a. 5 carbon sugar

b. phosphate group

## 2. Nitrogenous base- nitrogen containing molecule that makes up “step” or “rung” of ladder. 2 groups:



– A. Purines- molecule made of 2 rings, 2 types:

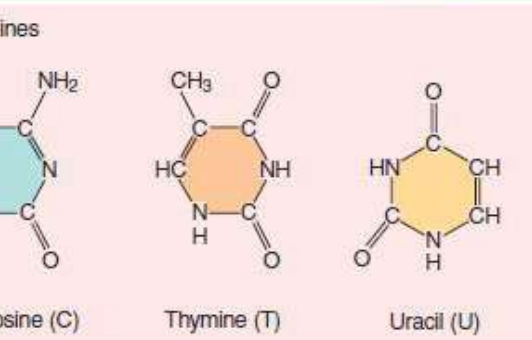
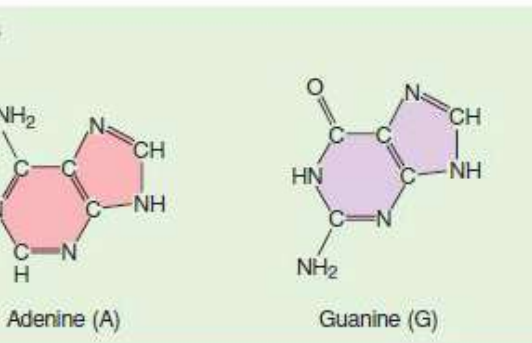
- 1. Adenine
- 2. Guanine

– B. Pyrimidines- molecule made up of 1 ring, 2 types:

- 1. Cytosine
- 2. Thymine

– C. Chargaff’s rule:  $A=T$  and  $C=G$

1950 Erwin Chargaff said all organisms have same nucleotides but they come in different proportions



# Watson & Crick

- 1950s Watson & Crick hypothesized DNA might be the genetic material
- Rosalind Franklin & Maurice Wilkins also studying DNA used x-ray to bombard DNA & diffraction showed pattern of X surrounded by circle.
  - Pattern & angle suggested double helix
  - used metal & wood models to determine structure (single ring alternating with double ring structure fit well)
- 1953 Watson & crick published– DNA in form of double helix (twisted ladder/spiral staircase)
  - Strands complementary and opposite of each other
    - Ex. One strand ACACAC other TGTGTG

# Structure of DNA

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- DNA nucleotides of single strand joined by covalent bonds b/w sugar of one nucleotide to phosphate of next
- Double helix held together by H bonds b/w bases in middle (individually weak but hold structure together)
- Base-pairing rules: Thymine T always pairs w/ Adenine A; Cytosine C always w. guanine.
  - A/T form 2 H bonds; C/G form 3 H bonds

