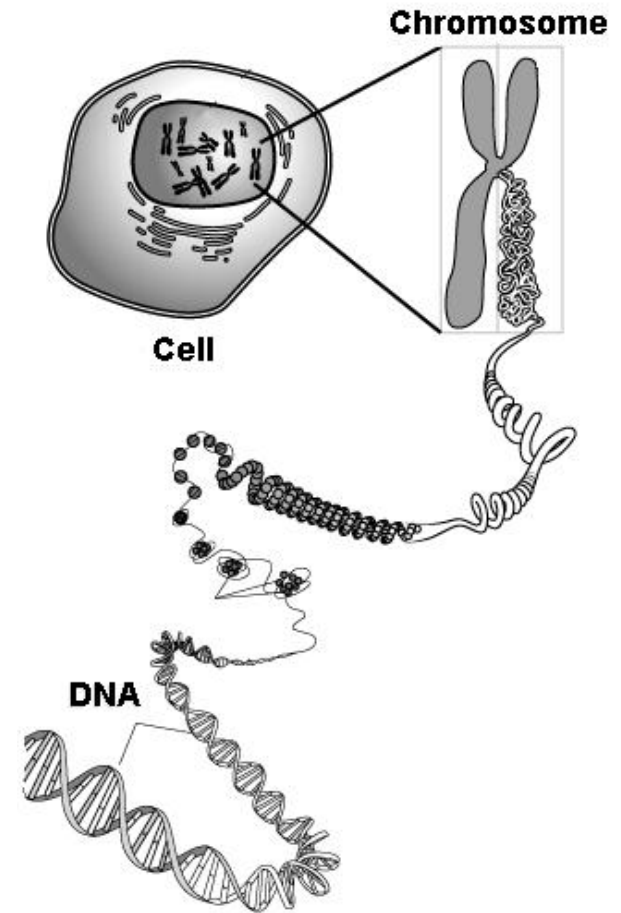

CHROMOSOMES, GENES AND DNA

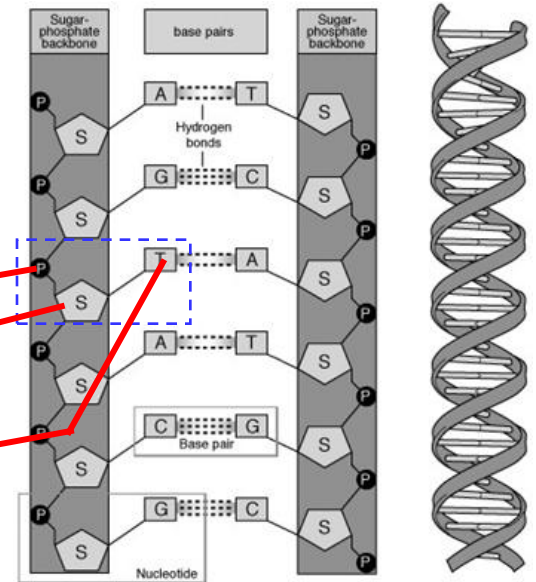
- A chromosome is essentially a **single DNA** molecule. Human somatic cells thus have 46 DNA molecules.
- DNA stands for "**deoxyribonucleic acid**", a term which describes the type of sugar (deoxyribose) and the location in the cell (nucleus).



- The building blocks of DNA are "**nucleotides**" which are attached together like a twisted ladder to form a "**double helix**".

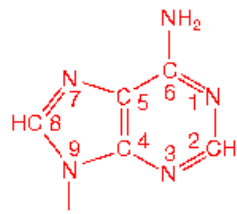
- Each nucleotide is composed of **three** parts:

- ❑ phosphate group
- ❑ deoxyribose sugar
- ❑ nitrogenous base

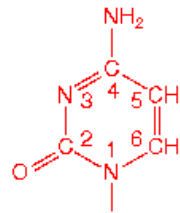


- There are four different kinds of bases so there are **four** different kinds of nucleotides:

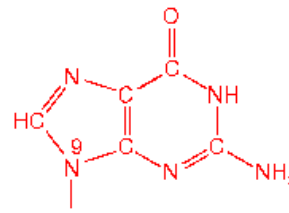
- A = Adenine G = Guanine (these are **purines**)
- C = Cytosine T = Thymine (these are **pyrimidines**)



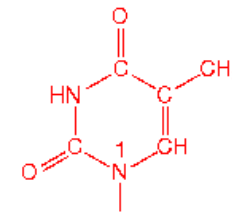
Adenine (A)



Cytosine (C)

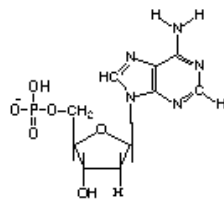


Guanine (G)

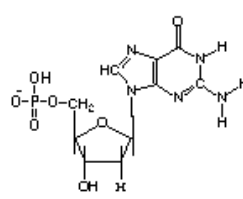


Thymine (T)

The Nucleotides of DNA

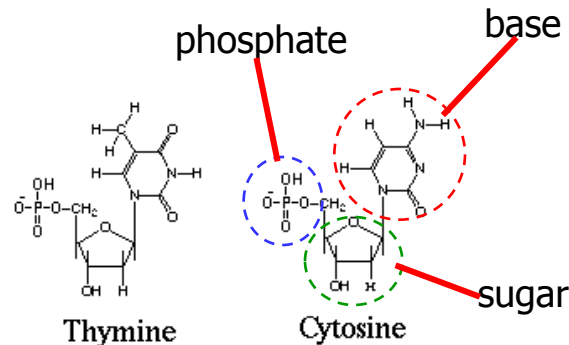


Adenine



Guanine

Purines

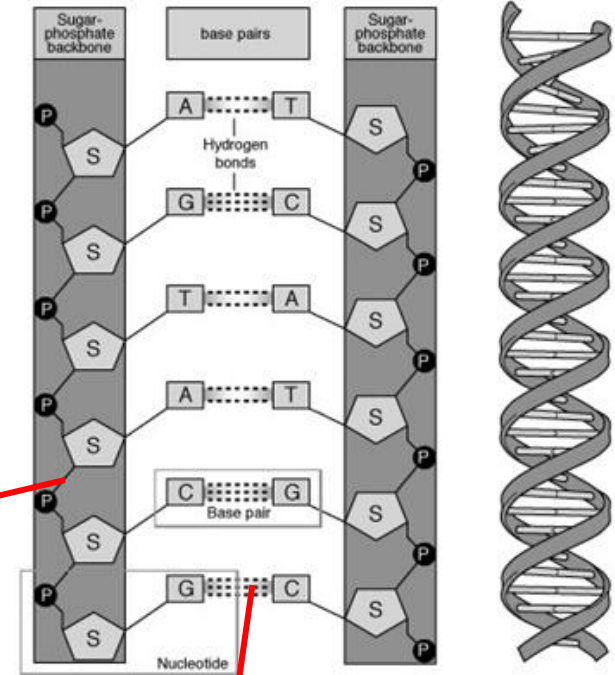


Thymine

Cytosine

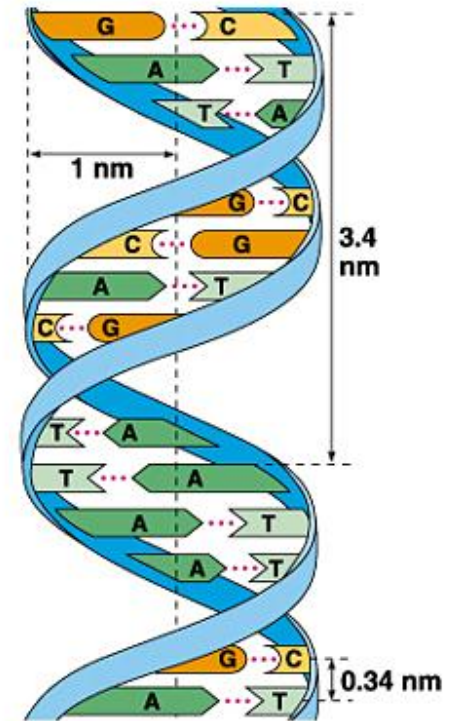
Pyrimidines

- The sugars and phosphate groups are on the outside of the molecule forming the "**sugar-phosphate backbone**". Each sugar is attached to the phosphate below by a "**covalent**" bond.



- The bases project into the middle and the base on one strand attaches to the base on the other strand by 2 or 3 "**hydrogen bonds**".

- Bases do not bond randomly.
- A bonds with T and C bonds with G (written as A-T and C-G).
- This is called "**complementary base pairing**" since the bases must fit properly together.



(a)

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- The order of these bases along the DNA is what makes up the "**genetic code**", the instructions to make your eyes blue and your hair curly, etc.

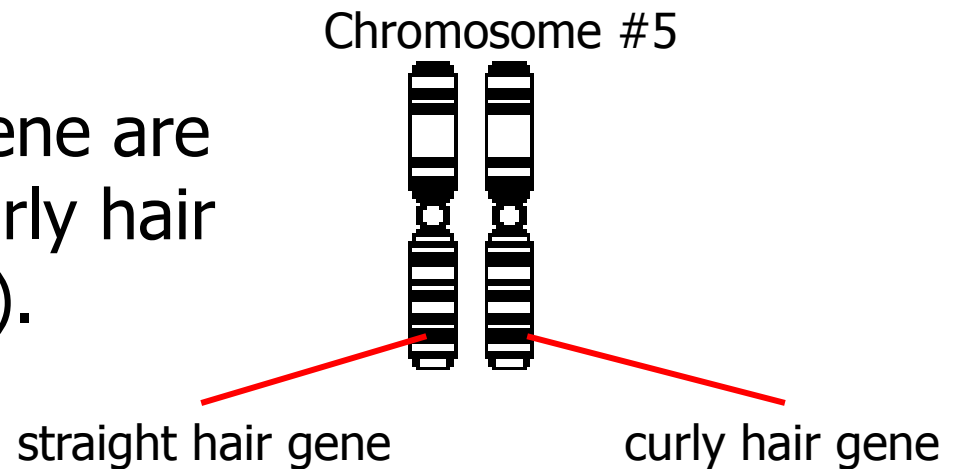
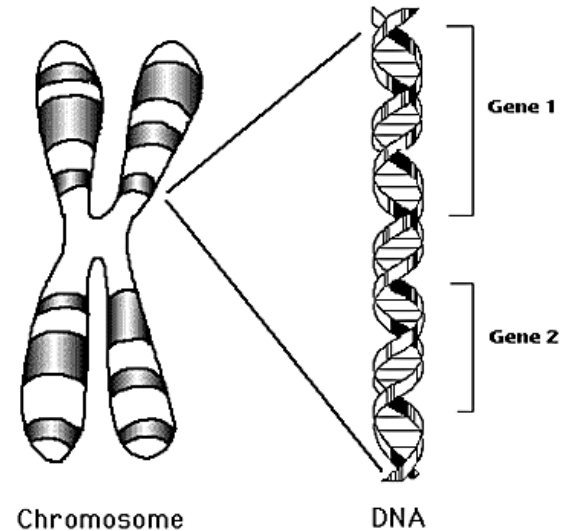
- Any change in the order of these bases causes a "**genetic mutation**".

| | | |
|---|---|---|
| A | | 5 |
| T | | 1 |
| C | | 9 |
| G | | 4 |
| C | → | 5 |
| C | | 2 |
| A | | 2 |
| A | | 6 |
| T | | 2 |
| T | | 0 |

- A stretch of DNA with enough bases to code for one trait (ie. eye colour) is called a "**gene**".

- You have two copies of each gene, one on each homologous chromosome.

- Alternate forms of a gene are called "**Alleles**" (ie. curly hair vs. straight hair genes).



- Scientists know the location and function of many genes on the chromosomes (**“chromosome mapping”**).
- It will eventually be possible to remove dysfunctional genes and insert healthy ones (**“gene therapy”**).
- This could lead to **“designer babies”**, choosing the genes for your baby.

