
DNA
DEOXYRIBONUCLEIC ACID

What is DNA?

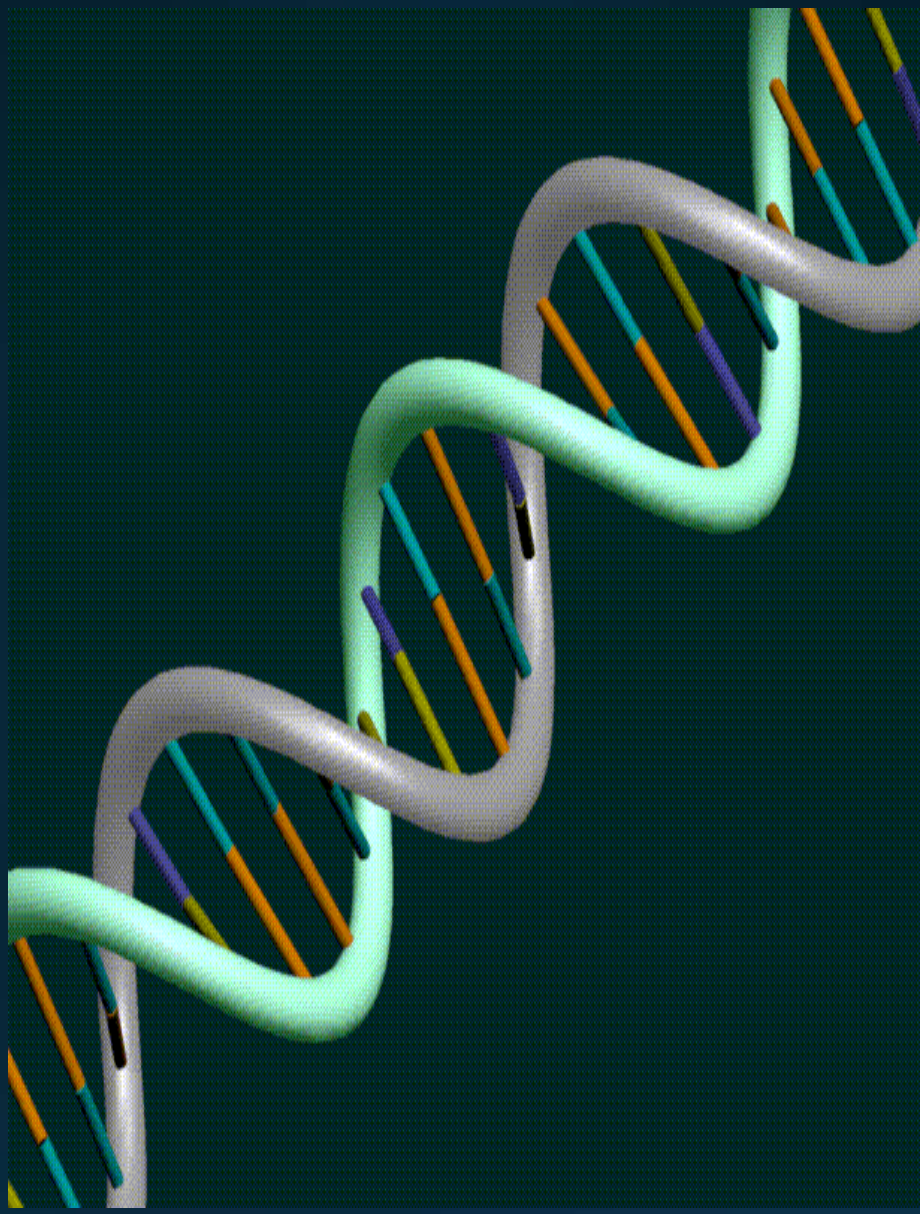
- A chemical code that is stored in a cell's hereditary material
- Contains information for an organisms growth and function.
- When a cell divides, the DNA code is copied and passed to the new cells so that every cell has the same DNA
- Every cell that has ever been formed in your body has DNA.

When and how was DNA discovered?

- 1952: It was discovered by a scientist named Rosalind Franklin that DNA is 2 chains of molecules in a spiral form (similar to a twisted ladder)
  - This shape is called a **DOUBLE HELIX**
- 1953: James Watson and Francis Crick made the first model of DNA

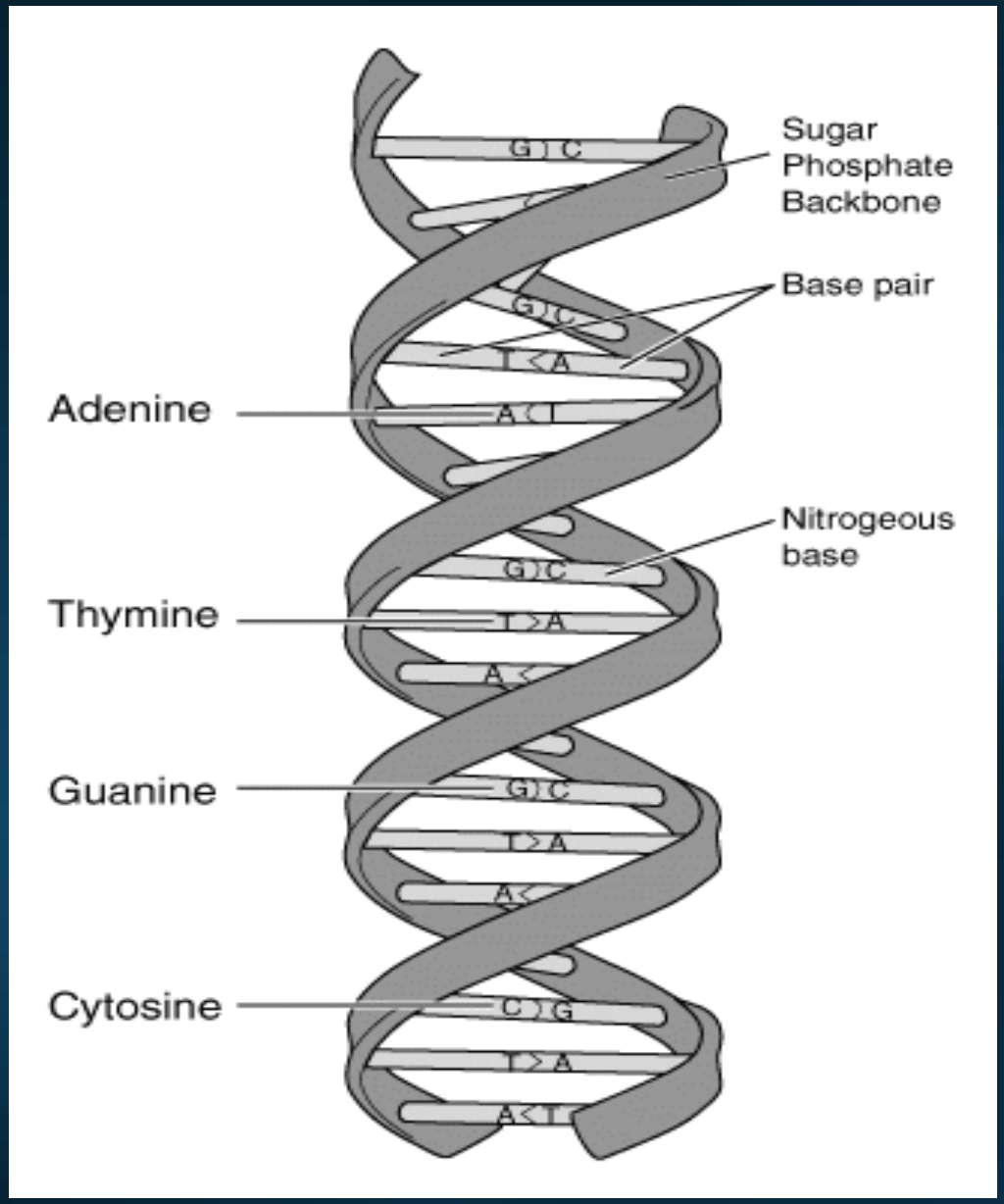
James Watson

Francis Crick



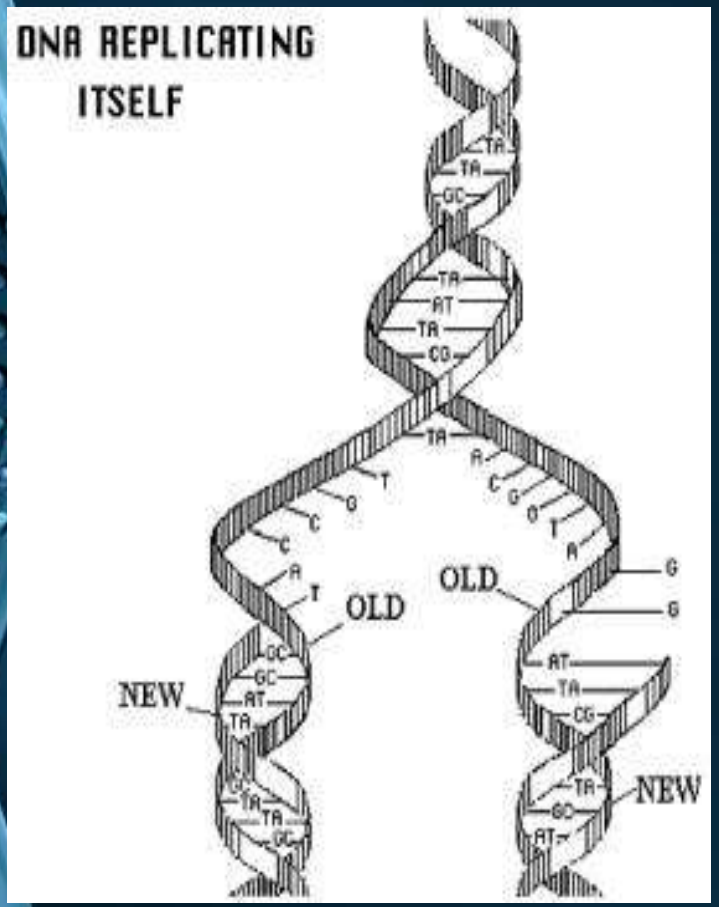
What is DNA made of?

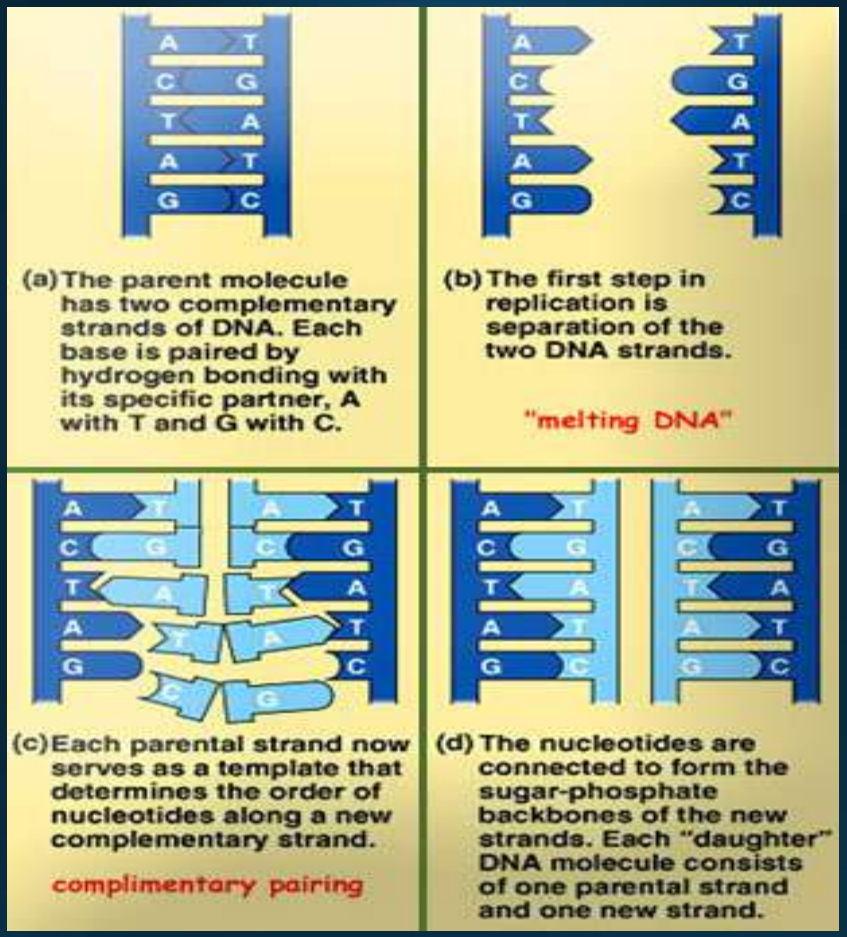
- Each side of the “ladder” is made up of sugar-phosphate molecules.
  - Each molecule contains the sugar called deoxyribose and a phosphate group.
- The “steps” of the ladder are made of other molecules called nitrogen bases
  - **4 KINDS OF NITROGEN BASES**
    1. Adenine (A)
    2. Guanine (G)
    3. Cytosine (C)
    4. Thymine (T)
  - Each ladder rung contains a pair of nitrogen bases
    - Adenine only pairs with Thymine (A & T)
    - Guanine only pairs with Cytosine (G & C)


Sugar
Phosphate
Backbone
Base pair
Adenine
Nitrogeous
base
Thymine
Guanine
Cytosine

How is DNA copied?

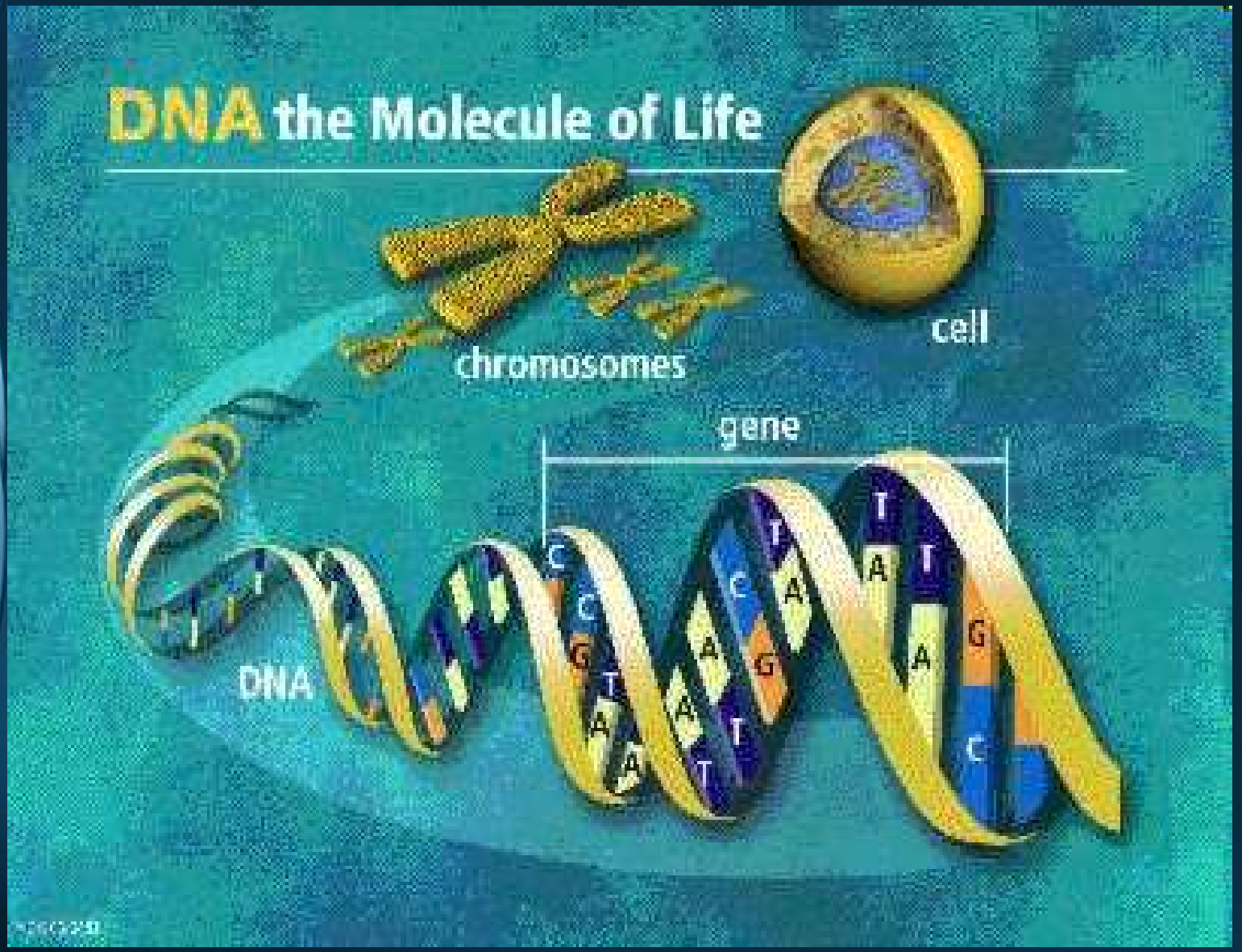
- The 2 sides of the DNA unwind and separate.





Genes

- Characteristics such as your hair color, height, and how things taste depend on the kinds of proteins your cells make.
- DNA in your cells stores the instructions for making these proteins!!
- These instructions are in a **GENE**, which is a section of DNA on a chromosome.
- Each chromosome contains hundreds of genes!!!

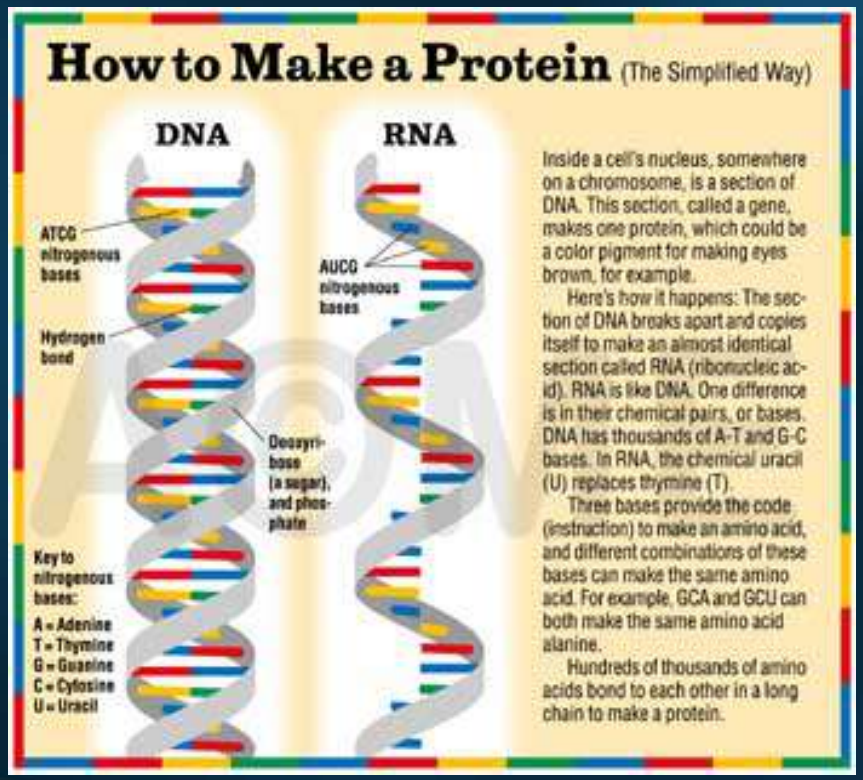

DNA the Molecule of Life
chromosomes
cell
gene
DNA

Making Proteins

- Proteins are made on ribosomes in the cell's cytoplasm
  - REMEMBER: Cytoplasm is the gelatin-like substance that flows inside the cell membrane, ribosomes are the small structures in which cells make proteins that are located in the cytoplasm or attached to the endoplasmic reticulum
- How do the codes for making the proteins get from the nucleus to the ribosomes?
  - The codes for making proteins are carried from the nucleus to the ribosomes by another type of nucleic acid called ribonucleic acid **(RNA).**
- RNA carries the codes for making proteins from the nucleus to the ribosomes in the cytoplasm.

RNA

- It is made in the nucleus on a DNA pattern.
- RNA is like DNA in structure, except that it only has half of the ladder.



RNA

- RNA is the same as DNA also in that it also contains Adenine (A), Guanine (G), and Cytosine (C), but it is different because instead of Thymine (T), it has Uracil (U)

DNA	RNA
A	A
G	G
C	C
T	U

Types of RNA

- 3 Kinds of RNA
  - Messenger RNA (mRNA)
    - Carries the code that directs the order in which amino acids bond
  - Ribosomal RNA (rRNA)
    - Make up ribosomes where proteins are built
  - Transport RNA (tRNA)
    - Brings amino acids to the ribosomes to build protein

Mutations

- Sometimes mistakes happen when DNA is being copied.
- If DNA is not copied exactly, the proteins made from the instructions might not be made correctly.
- Mutations are any permanent change in the DNA sequence of a gene or chromosome of a cell.

What happens when a mutation occurs?

- Mutations can change the traits of an organism
- Add variety to a species when the organism reproduces- VARIATION
- Many are harmful to organisms and can cause their death
- Some mutations do not have any effect on an organism
- Some mutations can be beneficial
  - EX: A mutation to a plant might cause it to produce a chemical that certain insects avoid. Now these insects will not want to eat the plant and the plant can survive.