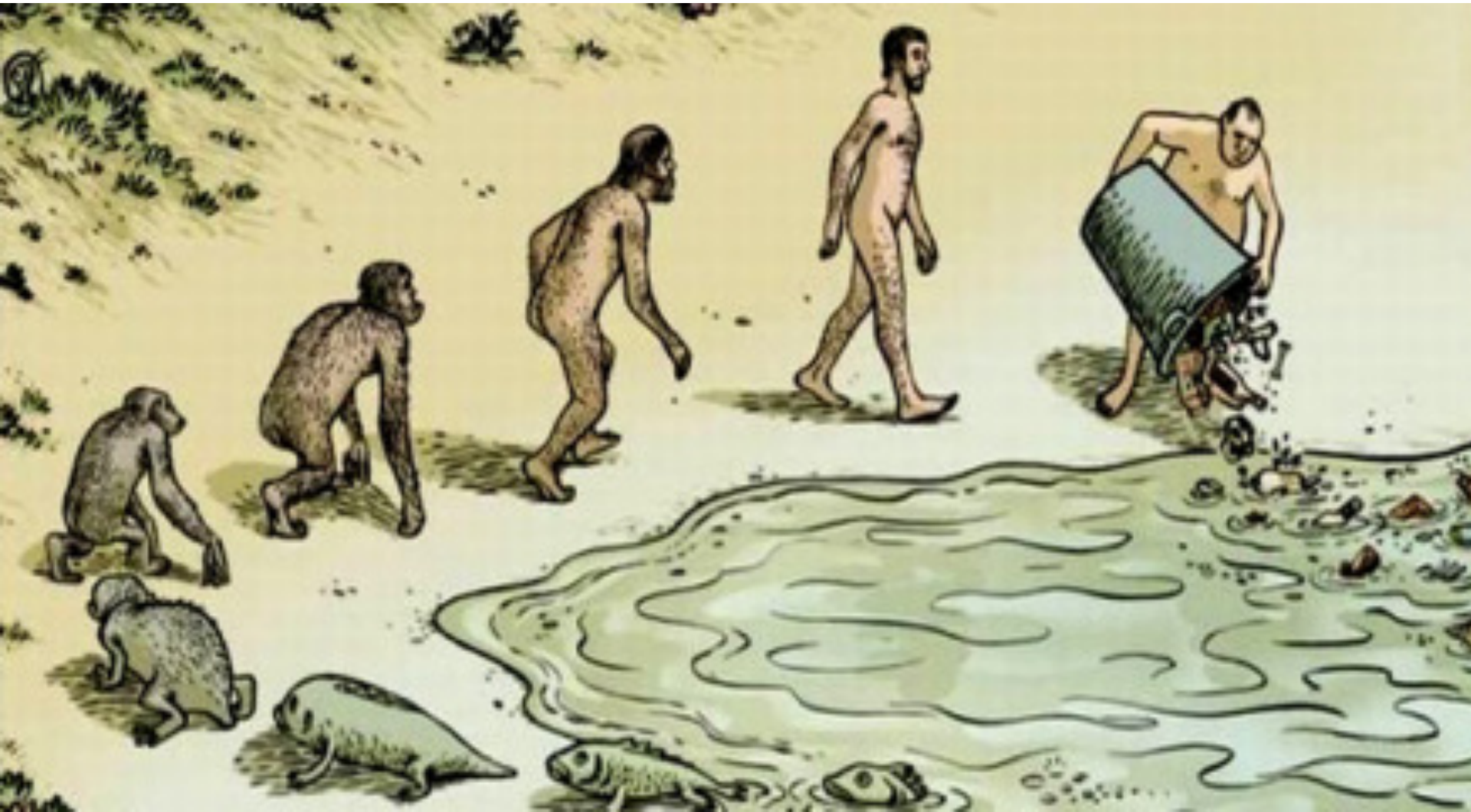
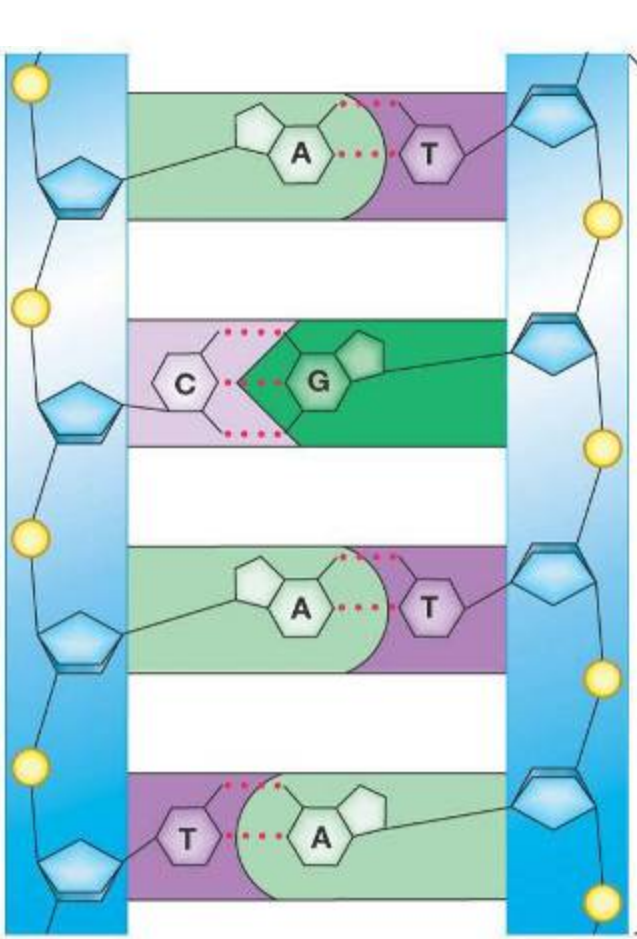
Unit 1
Adaption & Evolution



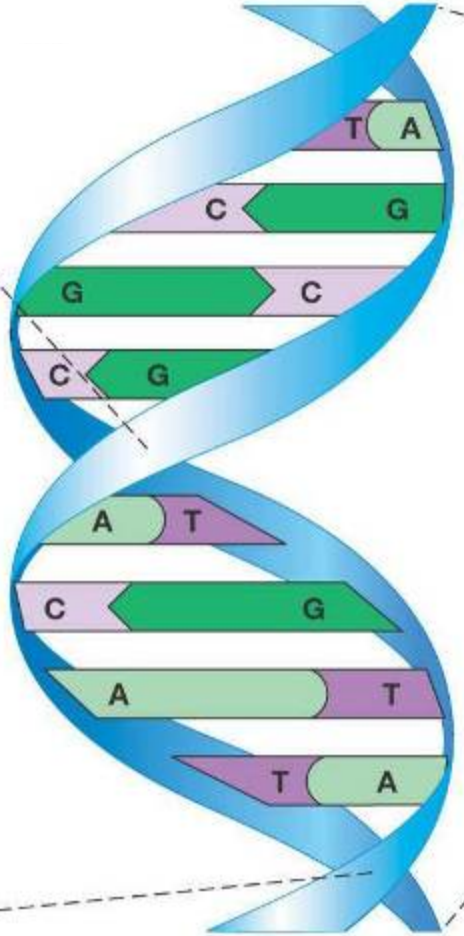
DNA

- **DNA** = deoxyribonucleic acid
- **Functions**:
  - Carrier of genetic information
  - Controls cell activities and gives you your traits
  - Found only in the nucleus – **NEVER LEAVES**
  - Made up of nucleotides joined together

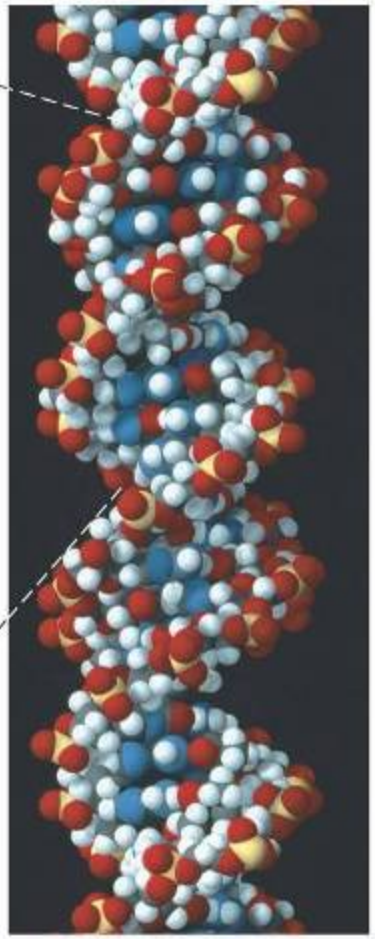
The structure of DNA



uncoiled diagram



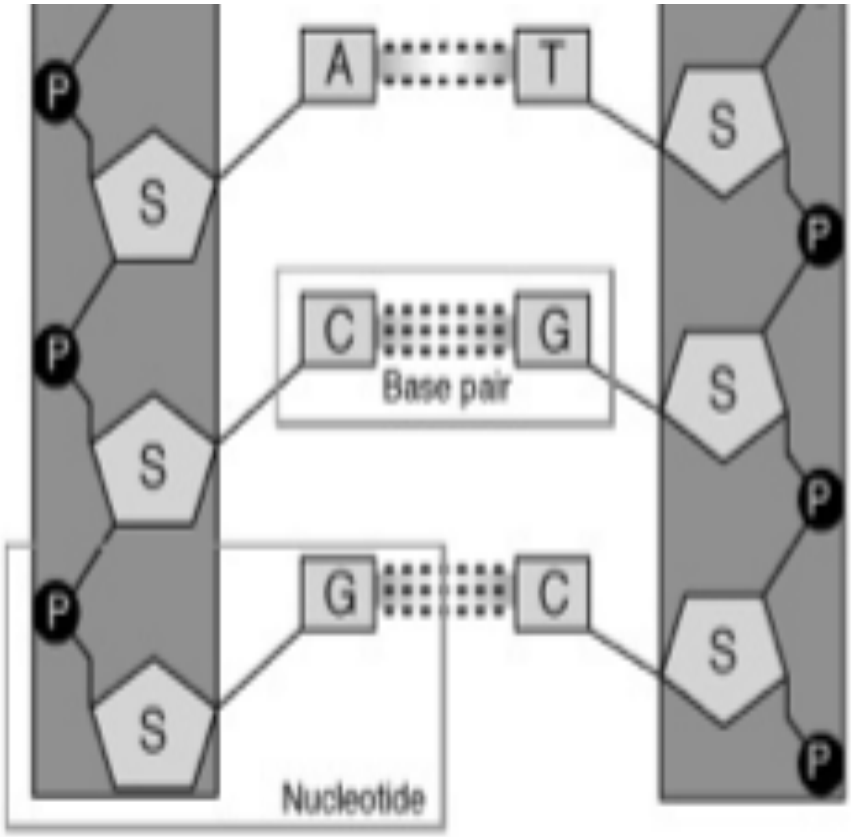
diagram



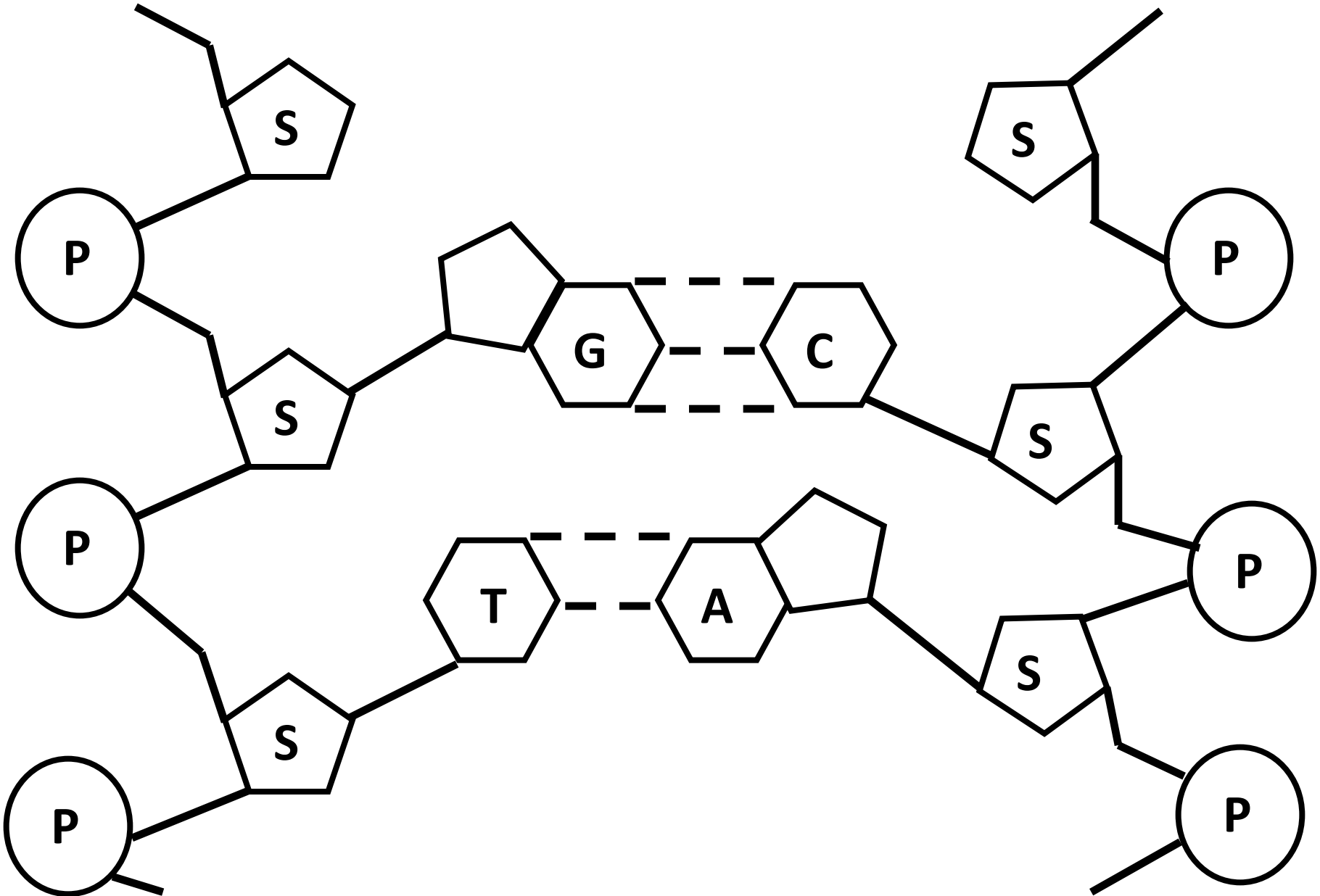
space-filling model

<u>Nucleotide</u> = the smallest basic unit of DNA

- 3 parts:
  1. Sugar = deoxyribose
  2. Phosphate group
  3. Nitrogen base (4 types)
     - Adenine (A)
     - Thymine (T)
     - Guanine (G)
     - Cytosine (C)



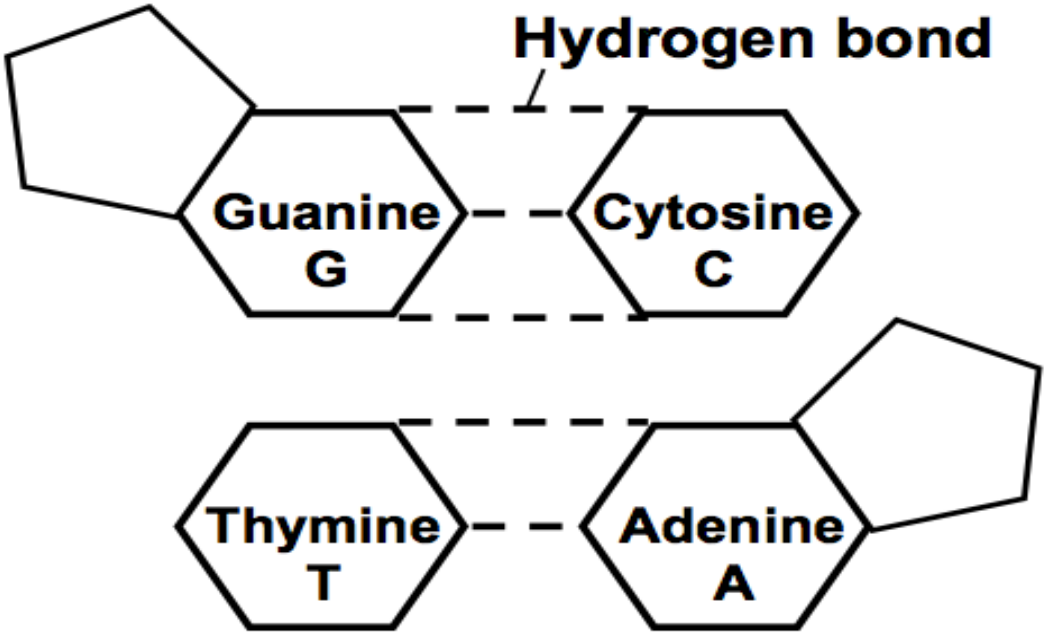
The structure of DNA



The Base Pairs

- **Adenine** *must* pair with **Thymine**
- **Guanine** *must* pair with **Cytosine**

- Paired nucleotides are held together by **<u>hydrogen</u>** **<u>bonds</u>** to form a chain of DNA

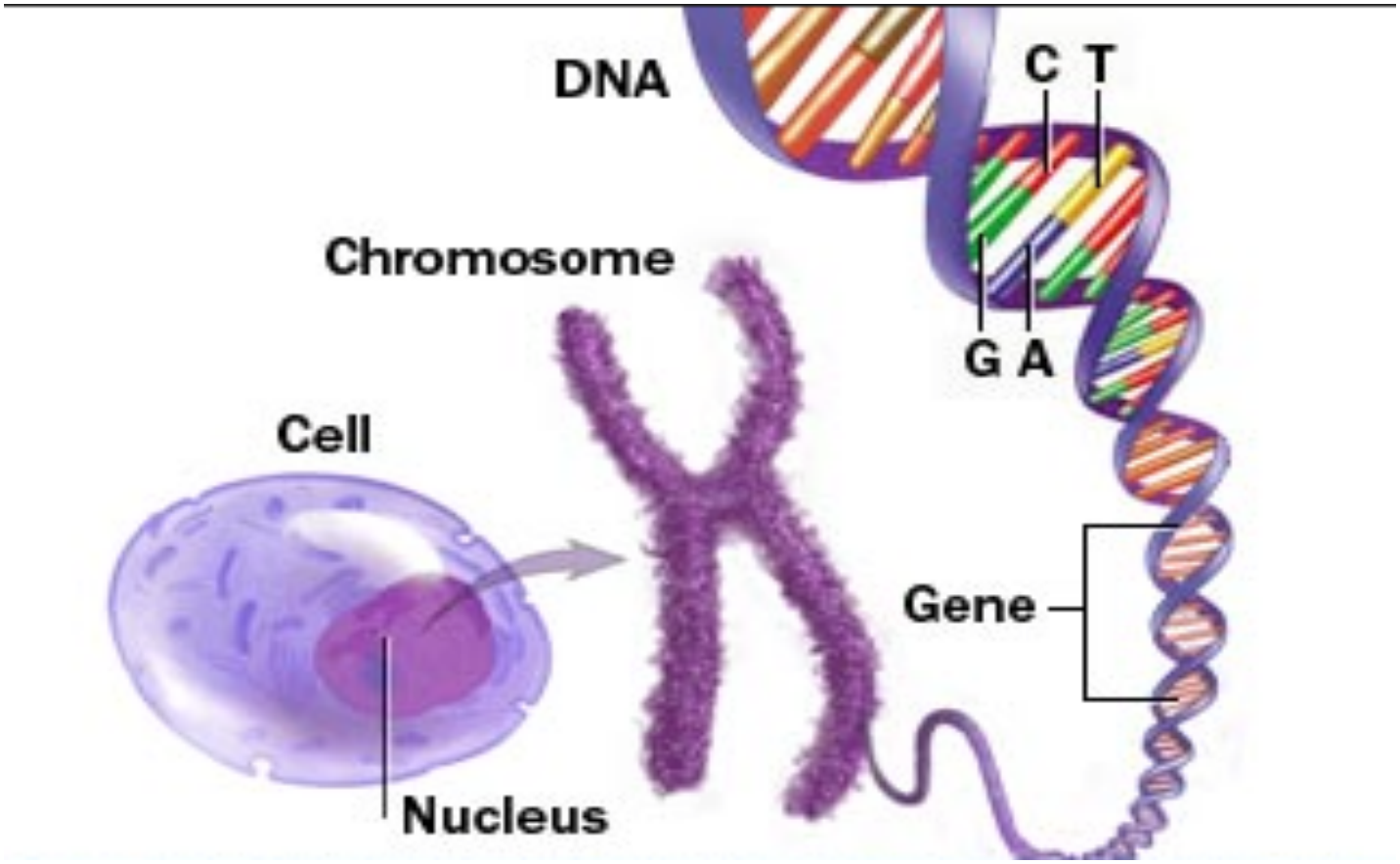


- Shape = double helix

- **<u>Chromosome</u>** = long strand of DNA with many genes
  - Humans have 46 chromosomes

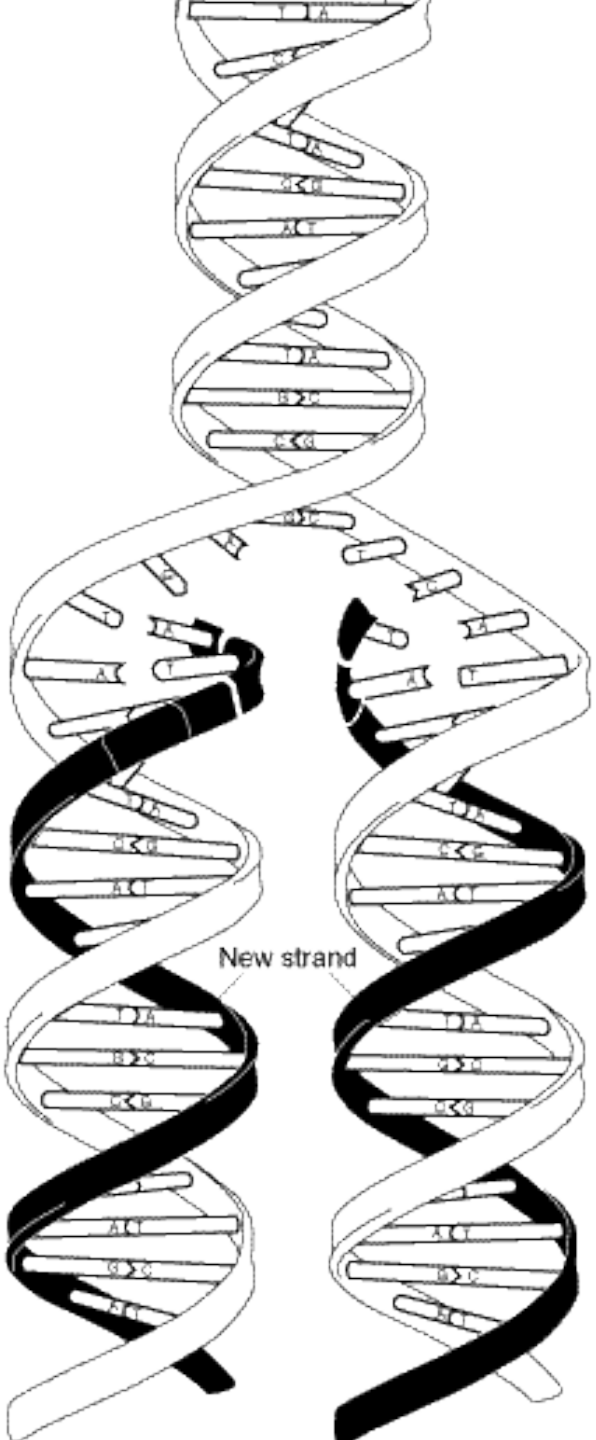
<u>Gene</u> = small strand of DNA

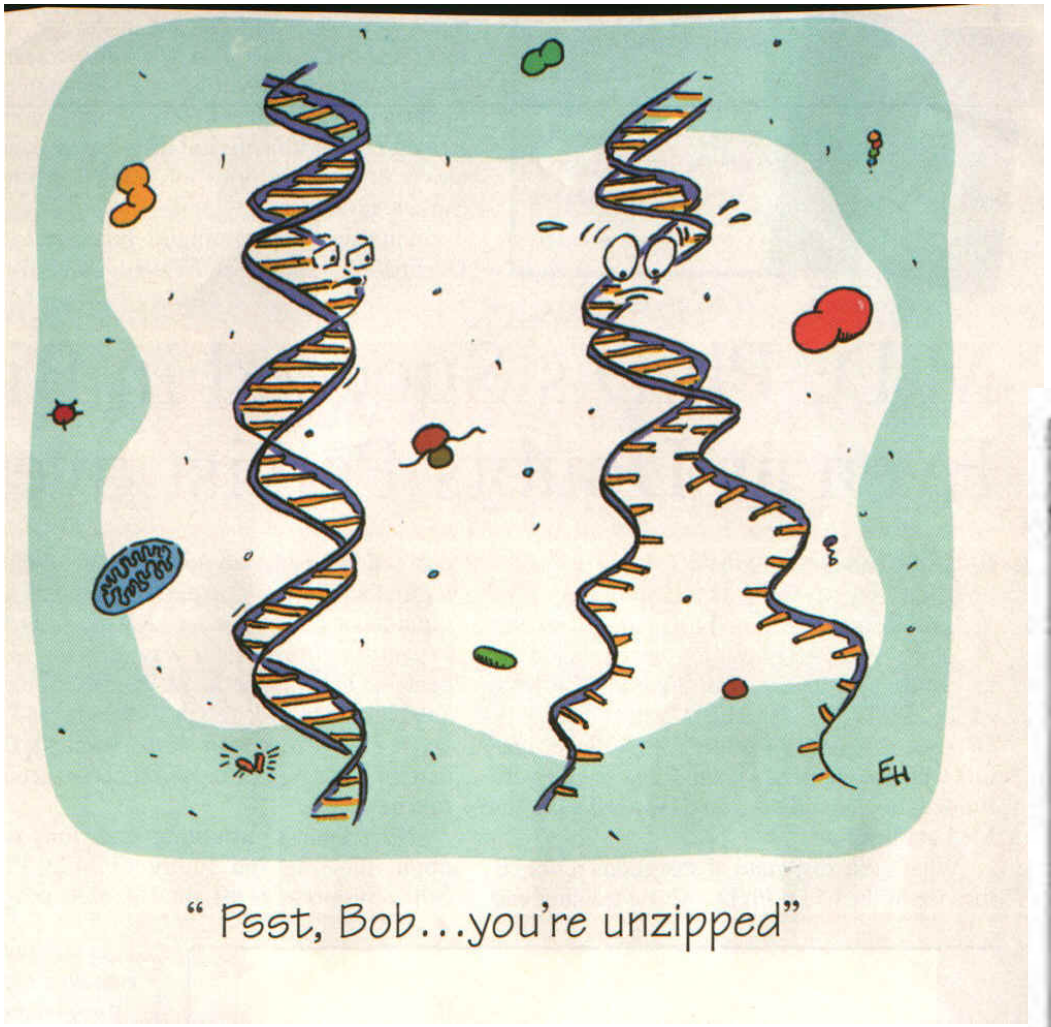
- codes for a particular protein or trait



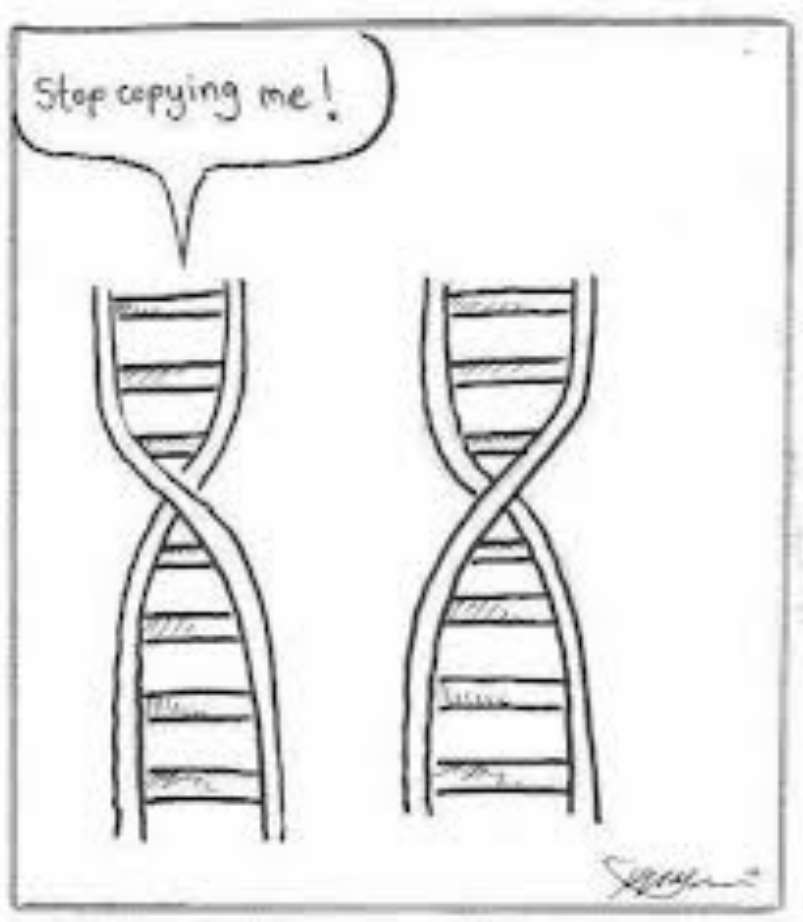
DNA replication

- Before cells divide through mitosis, a complete copy of their DNA must be made for the new cell
- ***STEPS***:
  - 2 parent strands “unzip”
  - Complementary base pairing occurs between the new strands: A-T & G-C





" Psst, Bob...you're unzipped"



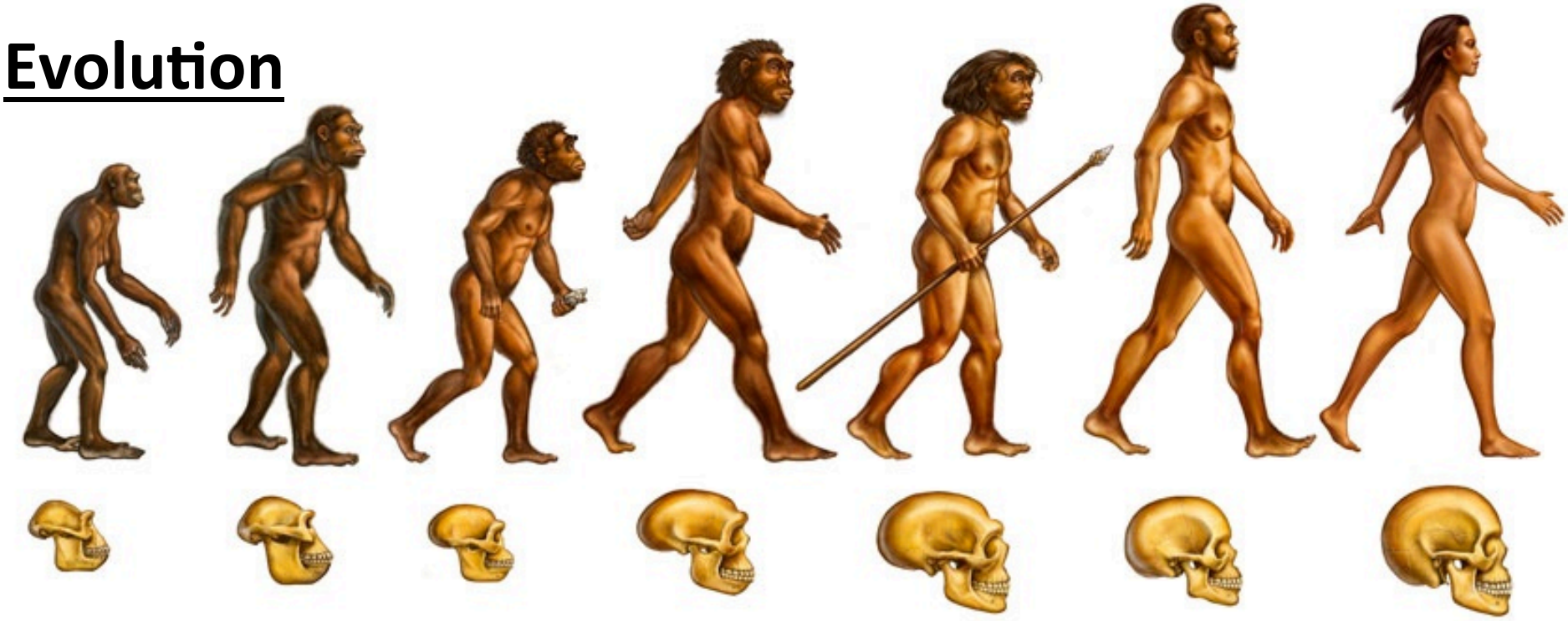
For more detailed, and entertaining, info …

Crash Course “DNA Structure and Replication”

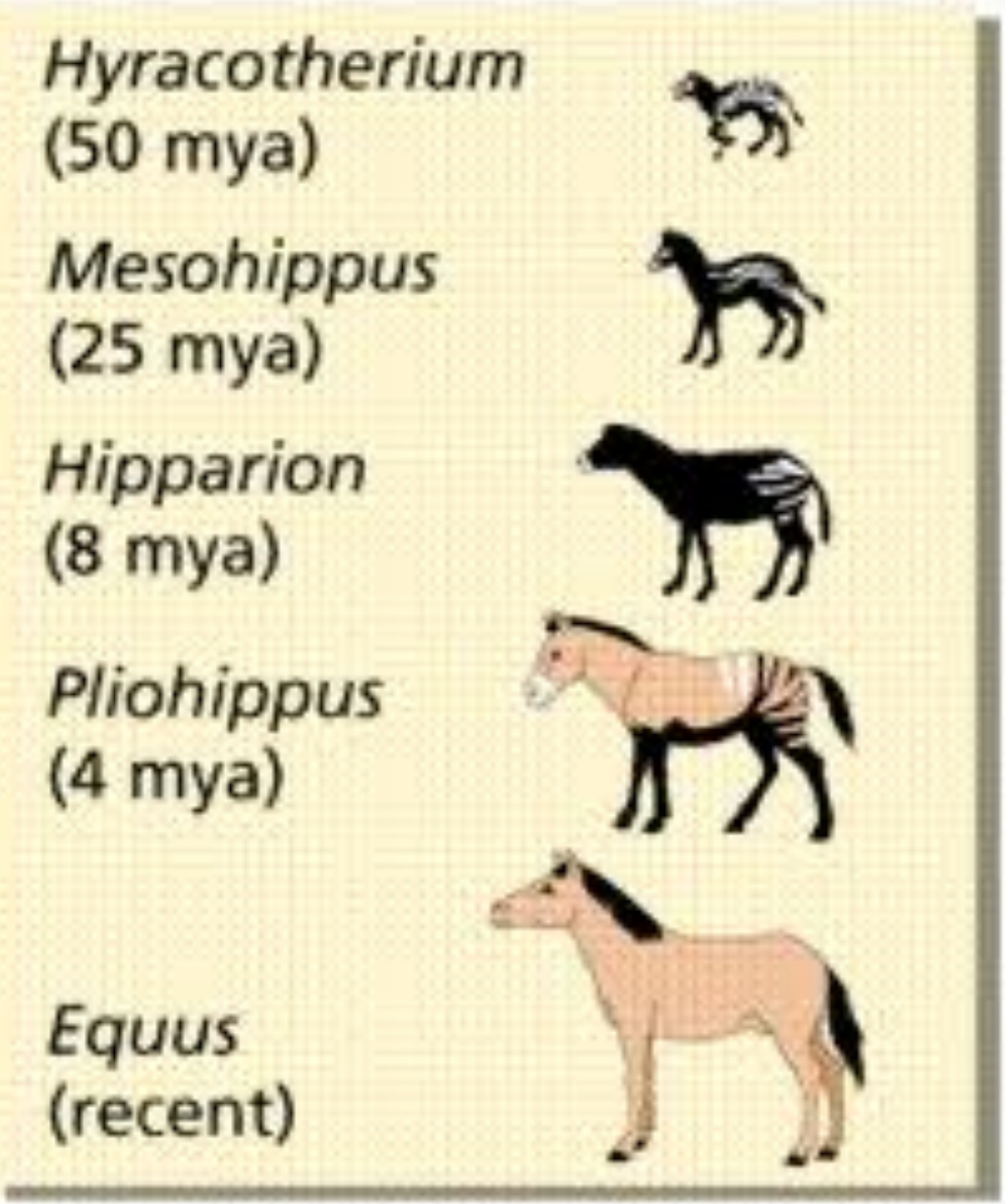
https://www.youtube.com/watch?v=JIPw-Bd0WGg

Role of DNA in Evolution

Evolution

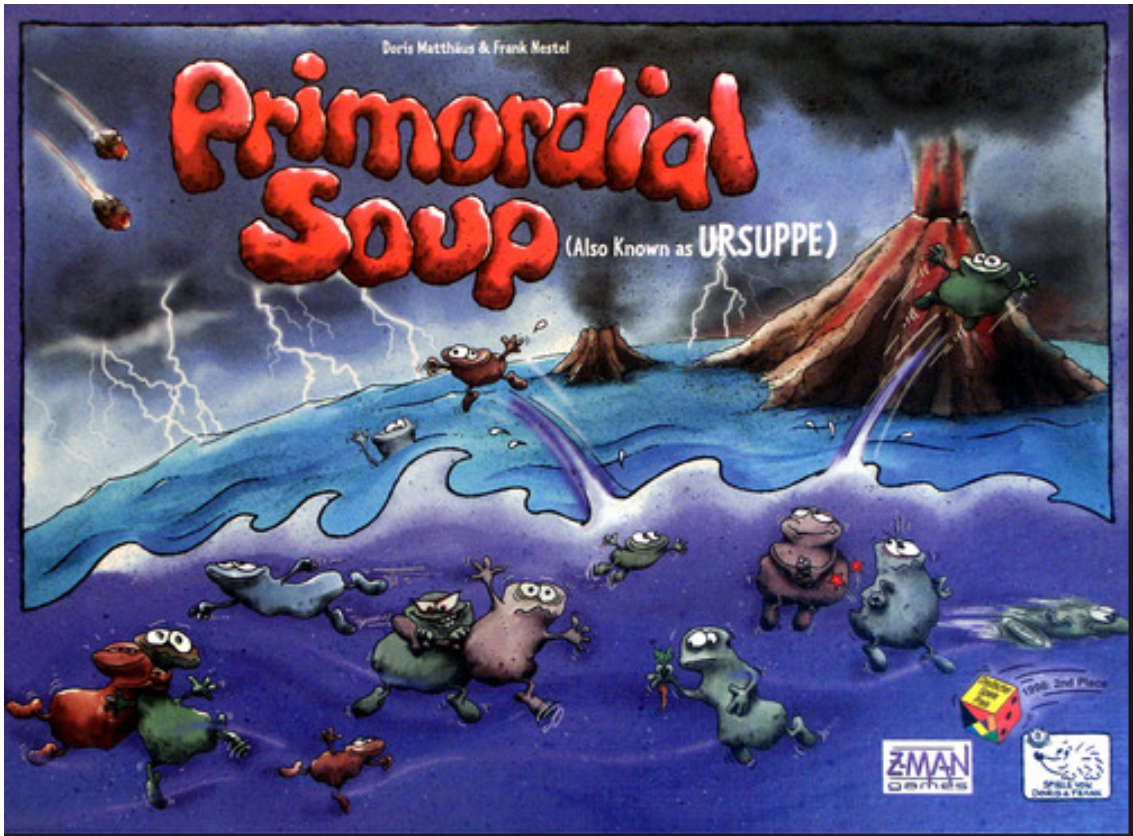


- **Evolution** = Theory that groups of organisms change over time
  - Occurs over many generations due to selection and adaption of changing environments.

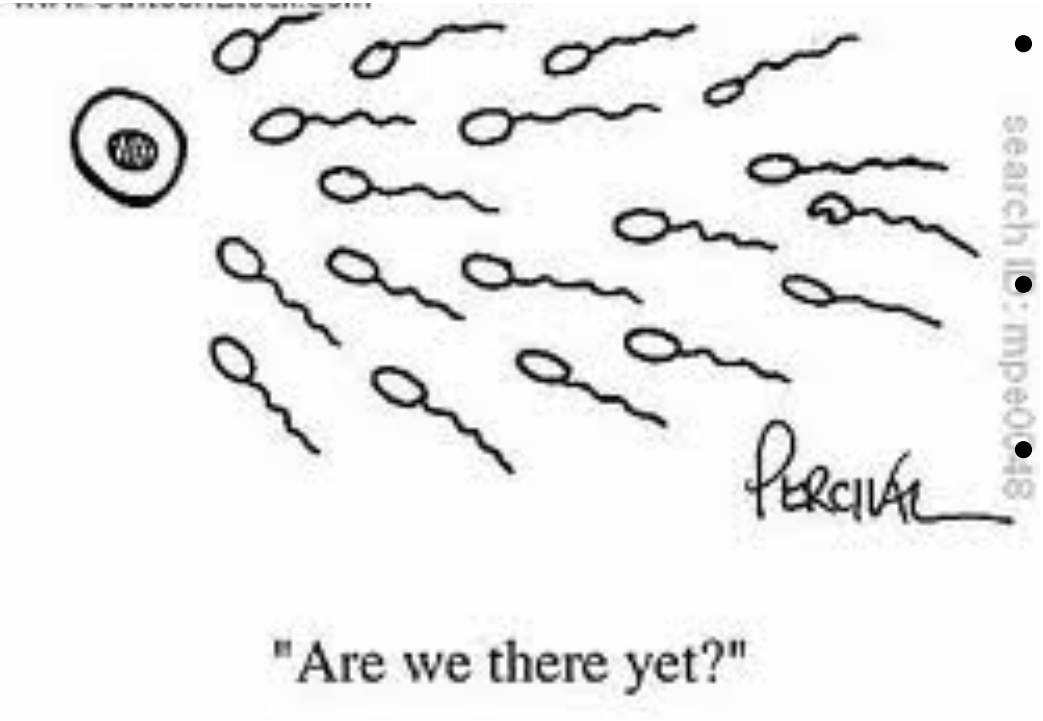

Hyracotherium
(50 mya)
Mesohippus
(25 mya)
Hipparion
(8 mya)
Pliohippus
(4 mya)
Equus
(recent)

“Primordial / Organic Soup”

- Single celled organisms in sea → multi-cellular organisms form in sea → fish start to breathe air (plants on shoreline & out of water) → fish walk up on land (mudskipper) → develop lungs land animals (plants on shoreline, out of water for periods of time & then move to land)
- **Bacteria and algae oxygenated the Earth**



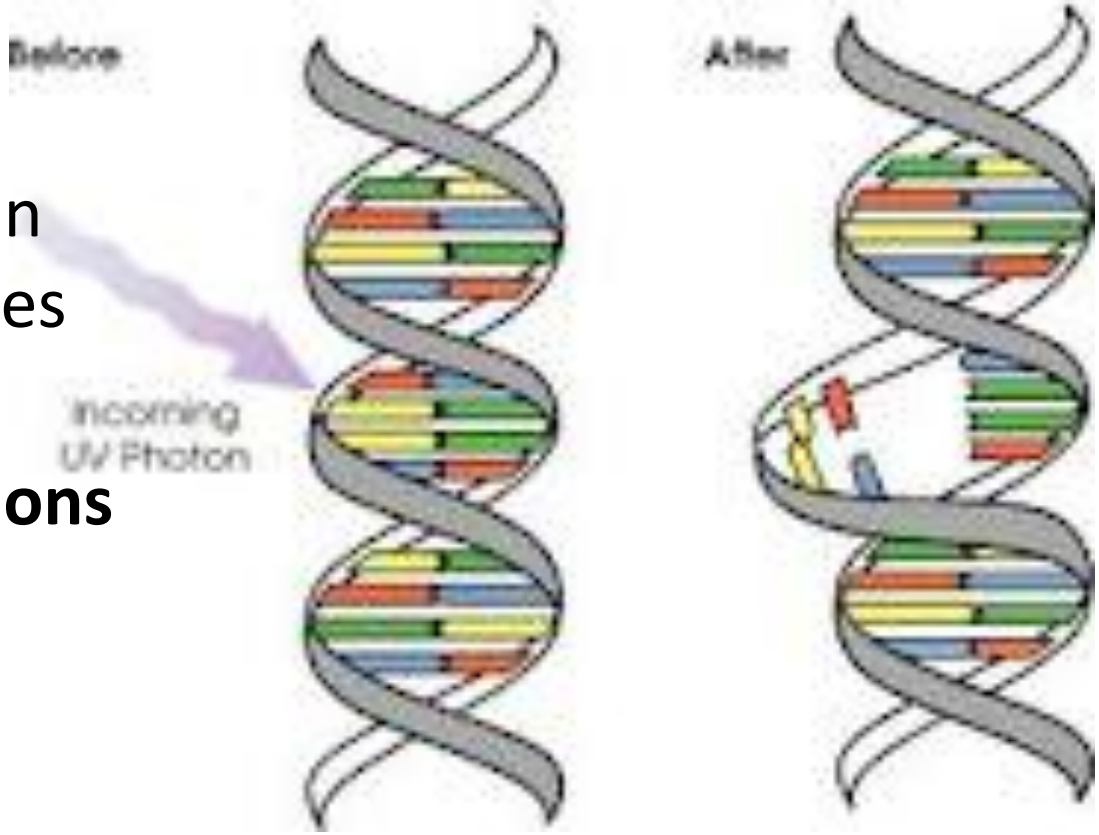
Sexual Reproduction



- Leads to variation – mixing of the genetic information (genes) from each parent
- Increases organisms chances for survival
- Causes sexual selection where preferences of females for male traits, or vise versa
- Mutations can be passed on by sexual reproduction – drives evolution.

Mutations

- A mutation is a permanent change in the structure of genes
- **Introduces NEW ALLELES to populations**



Diversity of life is necessary!

- If organisms of a species are too similar then they:

1. Won't be able to adapt to changes that occur

2. Could get wiped out by a virus

Species

- A species is an organism that can interbreed and produce fertile offspring and the individual all look similar.